

## CLAIMS

1 1. A system comprising plurality of devices, one of the devices operating as a task source device and  
2 at least one other device operating as a member of a synchrony group,

3 A. the task source device being configured to distribute a series of tasks to the synchrony group,  
4 each task being associated with a time stamp indicating a time, relative to a clock maintained  
5 by the task source device, at which the devices comprising the synchrony group are to  
6 execute the respective task;

7 B each member device being configured to:

8 (i) periodically obtain from the task source device an indication of a current time value  
9 indicated by the task source device's clock, and

10 (ii) determine, from the time stamp associated with each respective task and a time  
11 differential value representing a difference between the current time value indicated  
12 by the task source device's clock, and a current time value indicated by its respective  
13 clock, a time, relative to its respective clock, at which it is to execute the task.

1 2. A system as defined in claim 1 in which the synchrony group comprises a plurality of member  
2 devices.

1 3. A system as defined in claim 2 in which each device comprising a member of the synchrony group  
2 is further configured to execute each task that it receives from the task source device at the  
3 determined time, thereby to facilitate execution by them of respective tasks in the series in respective  
4 timing relationships relative to the time indicated by the task source device's clock.

1 4. A system as defined in claim 3 in which the member devices are configured to execute respective  
2 tasks in synchrony.

1 5. A system as defined in claim 2 in which one of the member devices operates as a master device  
2 for the synchrony group, any other member devices comprising respective slave devices, the master

3 device being configured to perform at least one type of synchrony group management operation in  
4 connection with the member devices comprising the synchrony group.

1 6. A system as defined in claim 5 further including a user interface module configured to control the  
2 master device's performance of said at least one type of synchrony group management operation, the  
3 master device being further configured to provide status information relating to the status of the  
4 synchrony group to the user interface module.

1 7. A system as defined in claim 6 in which the status information includes identifications of the  
2 devices comprising the synchrony group.

1 8. A system as defined in claim 6 in which the status information includes an identification of the  
2 task currently being executed.

1 9. A system as defined in claim 5, the system comprising at least one additional device, in which,  
2 in one type of synchrony group management operation, the master device is configured to enable the  
3 at least one additional device to join the synchrony group as a slave device.

1 10. A system as defined in claim 9 in which the task source device is configured to distribute tasks  
2 to the member devices using a selected multi-cast transmission methodology, the member devices  
3 being configured to buffer the tasks until they are to be executed, and further in which, when the at  
4 least one additional device joins the synchrony group as a slave device, the task source device is  
5 enabled to transmit at least one previously distributed task to the slave device using a selected  
6 unicast transmission methodology.

1 11. A system as defined in claim 5 in which, in at least one type of synchrony group management  
2 operation, the master device is configured to enable the task source device to join the synchrony  
3 group as a slave device, the task source device continuing to operate as the task source device for  
4 the synchrony group.

1 12. A system as defined in claim 5 in which, in at least one type of synchrony group management  
2 operation, the master device is configured to enable a slave device to disengage from the synchrony  
3 group, the disengaged slave device thereafter not being a member device in the synchrony group.

1 13. A system as defined in claim 5 in which, in at least one type of synchrony group management  
2 operation, the master device is configured to control the series of tasks to be distributed by the task  
3 source device.

1 14. A system as defined in claim 5 in which, in at least one type of synchrony group management  
2 operation, the master device is further configured to control execution by the member devices of the  
3 tasks that have been distributed by the task source device.

1 15. A system as defined in claim 14 in which the series of tasks includes a series of task sequences  
2 with each task sequence including a sub-set of the series of tasks, and further in which in at least one  
3 type of synchrony group management operation, the master device is configured to enable the  
4 member devices to terminate execution of a task sequence that is currently being executed.

1 16. A system as defined in claim 15 in which, in the synchrony group management operation  
2 enabling the member devices to terminate execution of a task sequence that is currently being  
3 executed, the master device enables the task source device to distribute a command to enable the  
4 member devices to terminate execution of the task sequence, the member devices being configured  
5 to, after receiving the command, terminate execution of the task sequence.

1 17. A system as defined in claim 14 in which the series of tasks includes a series of task sequences  
2 with each task sequence including a sub-set of the series of tasks, and further in which at least one  
3 type of synchrony group management operation, the master device is configured to enable the  
4 member devices to cancel execution of a task sequence that has been previously distributed, but for  
5 which execution has not begun.

1 18. A system as defined in claim 17 in which, in the synchrony group management operation  
2 enabling the member devices to cancel execution of a task sequence that has been previously  
3 distributed but for which execution has not begun, the master device enables the task source device  
4 to distribute a command to enable the member devices to cancel execution of the task sequence, the  
5 member devices being configured to, after receiving the command, cancel execution of the task  
6 sequence.

1 19. A system as defined in claim 5 in which, in at least one type of synchrony group management  
2 operation, the member device operating as the master device is configured to enable the master  
3 device to migrate from one member device to another member device in the synchrony group.

1 20. A system as defined in claim 5 in which, in at least one type of synchrony group management  
2 operation, the master device is configured to enable the task source device to migrate from one  
3 device to another device in the system.

1 21. A system as defined in claim 20 in which

2 A. the device operating as the task source device is configured to, after being enabled to migrate  
3 the task source device to said other device, provide migration information to the other device,  
4 the migration information including a source for information respecting the tasks to be  
5 distributed, timing information relative to the clock maintained by the task source device  
6 and identifications of the member devices,

7 B. the other device being configured to, after receiving the migration information,

8 i. distribute the series of tasks to the synchrony group, each task being associated with  
9 a time stamp indicating a time, relative to the timing information that it receives from  
10 the device operating as the task source device, at which the devices comprising the  
11 synchrony group are to execute the respective task, and

12 ii. notify the members of the synchrony group that it is to thereafter operate as the task  
13 source device.



1 22. A system as defined in claim 21 in which the information respecting the tasks that are to be  
2 distributed is a source of streaming information, the other device being configured to, after receiving  
3 the migration information, assemble the streaming information into tasks and associate each task  
4 with a said time stamp.

1 23. A system as defined in claim 21 in which the information respecting the tasks that are to be  
2 distributed is in a file identified in the migration information, the other device being configured to  
3 obtain information from the identified file, assemble the information into tasks and associate each  
4 task with a said time stamp.

1 24. A system as defined in claim 23 in which the information respecting the tasks that are to be  
2 distributed begins at an offset, identified in the migration information, into the identified file, the  
3 other device being configured to assemble the information from a position in the file associated with  
4 the identified offset.

1 25. A system as defined in claim 23 in which the information respecting the tasks that are to be  
2 distributed is in a series of files identified in the migration information, the other device being  
3 configured to obtain information from successive files in the series assemble the information into  
4 tasks and associate each task with as said time stamp.

1 26. A system as defined in claim 1 in which the task source device is further configured to distribute  
2 the tasks using a selected multi-cast message transmission methodology.

1 27. A system as defined in claim 1 in which the task source device is configured to provide,  
2 associated with at least one task, a time stamp indicating a task execution time later than the time  
3 currently indicated by the clock maintained by the task source device.

1 28. A system as defined in claim 27 in which the task source device is configured to select the delay  
2 interval between the time indicated by the time stamp and the current time so to be sufficient to  
3 provide that the at least one task distributed by the task source device can be executed by the  
4 member devices at the time indicated by the time stamp.

1 29. A system as defined in claim 28 in which the task source device is configured to select the delay  
2 interval between the time indicated by the time stamp and the current time so to be sufficient to  
3 provide that the at least one task distributed by the task source device can be distributed to the  
4 member devices for execution at the time indicated by the time stamp

1 30. A system as defined in claim 27 in which task source device is configured to obtain information  
2 associated with the tasks from at least two types of information sources, the task source device being  
3 further configured to select, for each task the delay interval between the time indicated by the time  
4 stamp and the current time based on the information source type that is associated with the respective  
5 task.

1 31. A system as defined in claim 1 in which at least one member device is further configured to  
2 adjust its clock rate in relation to a clock rate value maintained by the task source device's clock.

1 32. A system as defined in claim 31 in which the at least one member device is configured to adjust  
2 its clock rate in relation to time stamps associated with respective ones of the tasks received from  
3 the task source device.

1 33. A system as defined in claim 1 in which at least one other device operates as a task source device  
2 configured to distribute tasks to a second synchrony group, the device operating as the task source  
3 device for the first synchrony group also operating as a member device of a second synchrony group.

1 34. A system as defined in claim 1 in which at least one member device comprises:

2 A. a task receiving module configured to receive the series of tasks,

- 3 B. a current time retrieval module configured to obtain, from the task source device, the current  
4 time value as indicated by the task source's clock;
- 5 C. an execution time determination module configured to determine, from the time stamp  
6 associated with each respective task and a time differential value representing a difference  
7 between the current time value obtained by the current time retrieval module and a current  
8 time value indicated by a clock maintained by the device, a time, relative to the member  
9 device's respective clock at which the task is to be executed; and
- 10 D. a task execution module configured to execute each respective task at the time determined  
11 by the execution time determination module.

1 35. A system as defined in claim 34 further including a control module for controlling execution of  
2 commands received by said interface module.

1 36. A system as defined in claim 35 in which the at least one member device further comprises a  
2 buffer configured to buffer tasks that the task receiving module receives from the task source device  
3 until they are to be executed, the task execution module being configured to execute the buffered  
4 tasks at the times determined by the execution time determination module.

1 37. A system as defined in claim 36 in which the series of tasks includes a series of task sequences  
2 with each task sequence including a subset of the series of tasks, the interface module being further  
3 configured to receive task execution control commands for controlling task execution, the control  
4 module being configured to, in response to receipt of at least one task execution control command  
5 for controlling task execution, enable the task execution module to terminate execution of a task  
6 sequence currently being executed, being configured to not execute subsequent tasks in the task  
7 sequence that have been buffered.

1 38. A system as defined in claim 37 in which the control module is configured to enable the task  
2 execution module to resume execution of at least one task associated with a subsequent task  
3 sequence at a time determined by the execution time determination module.

1 39. A system as defined in claim 36 in which the series of tasks includes a series of task sequences  
2 with each task sequence including a subset of the series of tasks, the interface module being further  
3 configured to receive task execution control commands for controlling task execution, the control  
4 module being configured to, in response to receipt of at least one task execution control command  
5 to cancel execution of a task sequence for which at least one task has been buffered but for which  
6 execution has not begun, enable the task execution module to not execute tasks from that task  
7 sequence that have been buffered.

1 40. A system as defined in claim 39 in which the control module is configured to enable the task  
2 execution module to resume execution of at least one task associated with a task sequence  
3 subsequent to the task sequence for which at least one task has been buffered but for which execution  
4 has not begun.

1 41. A system as defined in claim 34 in which the member device includes:

- 2 A. a migration information receiving module configured to receive migration information from  
3 the task source device, the migration information including a source for information  
4 respecting the tasks to be distributed, timing information relative to the clock maintained by  
5 the task source device and identifications of the member devices of the synchrony group, and  
6 B. a migration control module configured to, after the migration information has been received.,  
7 i. distribute the series of tasks to the synchrony group, each task being associated with  
8 a time stamp indicating a time, relative to the timing information that it receives from  
9 the device operating as the task source device, at which the devices comprising the  
10 synchrony group are to execute the respective task, and  
11 ii. notify the members of the synchrony group that it is to thereafter operate as the task  
12 source device.

1 42. A system as defined in claim 41 in which the information respecting the tasks that are to be  
2 distributed is a source of streaming information, the migration control module being configured to,

3 after the migration information has been received, assembling the streaming information into tasks  
4 and associate each task with a said time stamp.

1 43. A system as defined in claim 41 in which the information respecting the tasks that are to be  
2 distributed is in a file identified in the migration information, the migration control module being  
3 configured to obtain information from the identified file, assemble the information into tasks and  
4 associate each task with a said time stamp.

1 44. A system as defined in claim 43 in which the information respecting the tasks that are to be  
2 distributed begins at an offset, identified in the migration information, into the identified file, the  
3 migration control module being configured to assemble the information from a position in the file  
4 associated with the identified offset.

1 45. A system as defined in claim 43 in which the information respecting the tasks that are to be  
2 distributed is in a series of files identified in the migration information, the migration control module  
3 being configured to obtain information from successive files in the series assemble the information  
4 into tasks and associate each task with as said time stamp.

1 46. A system as defined in claim 34 in which the member device further includes a clock rate  
2 adjustment module configured to adjust the member device's clock rate in relation to a clock rate  
3 value maintained by the task source device's clock.

1 47. A system as defined in claim 46 in which the clock rate adjustment module is configured to  
2 adjust the clock rate in relation to time stamps associated with respective ones of the tasks received  
3 from the task source device.

1 48. A system as defined in claim 1 in which the task source device comprises:

2 A. a task acquisition module configured to obtain respective ones of the tasks;

- 3 B. a task execution time determination module configured to determine a time at which each  
4 respective task is to be executed, and to associate the respective task with a time stamp  
5 indicating its execution time;
- 6 C. a task transmission module configured to transmit the series of tasks to said at least one other  
7 device; and
- 8 D. an execution control command generation module configured to, in response to a  
9 predetermined event, enable the task transmission module to insert into the series of tasks  
10 transmitted by the task transmission module a command to enable the at least one other  
11 device to modify the execution sequence of the tasks transmitted thereto.

1 49. A system as defined in claim 48 in which the task transmission module is configured to utilize  
2 a selected multi-cast transmission methodology.

1 50. A system as defined in claim 48 in which the predetermined event comprises input indicia  
2 provided by an operator.

1 51. A system as defined in claim 50 in which, in response to said predetermined event, the execution  
2 control command generation module is configured to enable the task transmission module to insert  
3 into the series of tasks transmitted by the task transmission module a command to enable the at least  
4 one other device to control execution of at least one task in relation to the time the predetermined  
5 event occurs.

1 52. A system as defined in claim 51 in which, in response to said predetermined event, the execution  
2 control command generation module is configured to enable the task transmission module to insert  
3 into the series of tasks transmitted by the task transmission module a command to enable the at least  
4 one other device to terminate execution of a task that it is currently executing and/or to not execute  
5 at least one task that is to be executed subsequent to the predetermined event.

1 53. A system as defined in claim 51 in which the series of tasks includes a series of task sequences  
2 with each task sequence including a sub-set of the series of tasks, the execution control command  
3 generation module being configured to, in response to said predetermined event,

4 (i) enable the task transmission module to insert into the series of tasks transmitted by the task  
5 transmission module, a command enabling the at least one other device to terminate  
6 execution of the currently executing task and/or to not execute at least one subsequent task,  
7 if any, in the task sequence including the currently executing task; and

8 (ii) enable

9 (a) the task execution time determination module to provide that time stamps associated  
10 with tasks of task sequences subsequent to the task sequence currently being  
11 executed will reflect the termination and/or non-execution of tasks from the task  
12 sequence of the task that is currently being executed, and

13 (b) the task transmission module to transmit the tasks of the subsequent task sequences  
14 to the at least one other device.

1 54. A system as defined in claim 53 in which the task transmission module is configured to insert  
2 a command to enable the at least one other device to not execute all tasks in the task sequence  
3 subsequent to the terminated and/or non-executed task.

1 55. A system as defined in claim 48 in which, in response to said predetermined event, the execution  
2 control command generation module is configured to enable the task transmission module to insert  
3 into the series of tasks transmitted by the task transmission module a command to enable the at least  
4 one other device to control execution of a task in relation to the task's position in the series of tasks.

1 56. A system as defined in claim 55 in which, in response to said predetermined event, the execution  
2 control command generation module is configured to enable the task transmission module to insert  
3 into the series of tasks transmitted by the task transmission module a command to enable the at least  
4 one other device to cancel execution of a task in relation to the task's position in the series of tasks.

1 57. A system as defined in claim 55 in which, in response to said predetermined event, the execution  
2 control command generation module is configured to enable the task transmission module to insert  
3 into the series of tasks transmitted by the task transmission module a command to enable the at least  
4 one other device to cancel execution of a previously-transmitted task in relation to the task's position  
5 in the series of tasks.

1 58. A system as defined in claim 57 in which, in response to said predetermined event, the execution  
2 control command generation module is configured to enable the task transmission module to insert  
3 into the series of tasks transmitted by the task transmission module a command to enable the at least  
4 one other device to cancel execution of a previously-transmitted task, in relation to the task's position  
5 in the series of tasks, for which execution has not begun.

1 59. A system as defined in claim 55 in which the series of tasks includes a series of task sequences  
2 with each task sequence including a sub-set of the series of tasks, the execution control command  
3 generation module being configured to, in response to said predetermined event,

4 (i) enable the task transmission module to insert into the series of tasks transmitted by the task  
5 transmission module, a command enabling the at least one other device to cancel execution  
6 of a task sequence for which execution has not begun; and

7 (ii) enable

8 (a) the task execution time determination module to provide that time stamps associated  
9 with tasks of task sequences subsequent to the task sequence whose execution was  
10 cancelled will reflect the cancellation, and

11 (b) the task transmission module to transmit the tasks of the subsequent task sequences  
12 to the at least one other device.

1 60 A system as defined in claim 1 in which the task source device comprises:

2 A. a task acquisition module configured to obtain respective ones of the tasks;



- 3 B. a task execution time determination module configured to determine a time at which each  
4 respective task is to be executed, and to associate the respective task with a time stamp  
5 indicating its execution time;
- 6 C. a task transmission module configured to transmit the series of tasks to said at least one other  
7 device; and
- 8 D. a task source device migration control module configured to, in response to a predetermined  
9 event, provide migration information to another device, the migration information including  
10 a source for information respecting the tasks to be distributed, timing information relative  
11 to the clock maintained by the task source device and identifications of the member devices  
12 of the synchrony group.

1 61. A system as defined in claim 60 in which the task source device is configured to provide,  
2 associated with at least one task, a time stamp indicating a task execution time later than the time  
3 currently indicated by the clock maintained by the task source device.

1 62. A system as defined in claim 61 in which the task source device is configured to select the delay  
2 interval between the time indicated by the time stamp and the current time so to be sufficient to  
3 provide that the at least one task distributed by the task source device can be executed by the  
4 member devices at the time indicated by the time stamp.

1 63. A system as defined in claim 62 in which the task source device is configured to select the delay  
2 interval between the time indicated by the time stamp and the current time so to be sufficient to  
3 provide that the at least one task distributed by the task source device can be distributed to the  
4 member devices for execution at the time indicated by the time stamp

1 64. A system as defined in claim 62 in which task source device is configured to obtain information  
2 associated with the tasks from at least two types of information sources, the task source device being  
3 further configured to select, for each task the delay interval between the time indicated by the time

4 stamp and the current time based on the information source type that is associated with the respective  
5 task.

1 65. A device for executing a series of tasks provided by a task source at times specified by the task  
2 source in relation to a clock maintained by the task source, the device comprising

- 3 A. an interface module configured to receive the series of tasks, each task being associated with  
4 a time stamp, each time stamp indicating a time value relative to a time indicated a clock  
5 maintained by the task source, at which the device is to execute the respective task;  
6 B. a current time retrieval module configured to obtain, from the task source, a current time  
7 value as indicated by the task source's clock;  
8 C. an execution time determination module configured to determine, from the time stamp  
9 associated with each respective task and a time differential value representing a difference  
10 between the current time value obtained by the current time retrieval module and a current  
11 time value indicated by a clock maintained by the device, a time, relative to the device's  
12 respective clock, at which the task is to be executed; and  
13 D. a task execution module configured to execute each respective task at the time determined  
14 by the execution time determination module.

1 66. A device as defined in claim 65 further including a control module for controlling execution of  
2 commands received by said interface module.

1 67. A device as defined in claim 65 further comprising a buffer configured to buffer tasks that the  
2 interface module has received until they are to be executed, the task execution module being  
3 configured to execute the buffered tasks at the times determined by the execution time determination  
4 module.

1 68. A device as defined in claim 67 in which the series of tasks includes a series of task sequences  
2 with each task sequence including a subset of the series of tasks, the interface module being further  
3 configured to receive task execution control commands for controlling task execution, the control

4 module being configured to, in response to receipt of at least one task execution control command  
5 for controlling task execution, enable the task execution module to terminate execution of a task  
6 sequence currently being executed, being configured to not execute subsequent tasks in the task  
7 sequence that have been buffered.

1 69. A device as defined in claim 68 in which the control module is configured to enable the task  
2 execution module to resume execution of at least one task associated with a subsequent task  
3 sequence at a time determined by the execution time determination module.

1 70. A device as defined in claim 69 in which the series of tasks includes a series of task sequences  
2 with each task sequence including a subset of the series of tasks, the interface module being further  
3 configured to receive task execution control commands for controlling task execution, the control  
4 module being configured to, in response to receipt of at least one task execution control command  
5 to cancel execution of a task sequence for which at least one task has been buffered but for which  
6 execution has not begun, enable the task execution module to not execute tasks from that task  
7 sequence that have been buffered.

1 71. A device as defined in claim 70 in which the control module is configured to enable the task  
2 execution module to resume execution of at least one task associated with a task sequence  
3 subsequent to the task sequence for which at least one task has been buffered but for which execution  
4 has not begun.

1 72. A device as defined in claim 66, the control module being configured to, in response to receipt  
2 of a command to become a member of a synchrony group, enable the interface module to receive  
3 tasks for execution by the task execution module.

1 73. A device as defined in claim 72 in which the control module is configured to, in response to  
2 receipt of a command to become a member of a synchrony group, enable the interface module to  
3 receive tasks currently being transmitted using a selected multi-cast transmission methodology, and

4 further to retrieve at least one previously distributed task using a selected unicast transmission  
5 methodology.

1 74. A device as defined in claim 65 in which the control module is configured to, in receipt of a  
2 command to disengage from a synchrony group, disable the interface module from receiving tasks  
3 and the task execution module from executing previously received tasks that have not yet been  
4 executed.

1 75. A device as defined in claim 65 further comprising a user interface module interface module  
2 configured to receive control information from a user interface module, the control module being  
3 configured to enable selected operations to be performed in response to the control information.

1 76. A device as defined in claim 75 in which, in response to control information to enable another  
2 device to become a member of the device's synchrony group, the control module enables the  
3 interface module to transmit a command to the other device to enable the other device to become a  
4 member of the synchrony group.

1 77. A device as defined in claim 75 in which, in response to control information to enable another  
2 device that is a member of the device's synchrony group to disengage from the synchrony group, the  
3 control module enables the interface module to transmit a command to the other device to enable the  
4 other device to disengage from the synchrony group.

1 78. A device as defined in claim 75 in which, in response to control information to enable the task  
2 source to begin operating, the control module performs selected operations to enable the task source  
3 to begin operating.

1 79. A device as defined in claim 78, the device also operating as the task source, the device including  
2 a task generator module configured to, under control of the control module, obtain information from  
3 which the tasks are to be generated and generate the tasks.

1 80. A device as defined in claim 79 in which the interface module is further configured to transmit  
2 the tasks to at least one other device.

1 81. A device as defined in claim 79 in which the device is not the task source, the control module  
2 being configured to enable the interface module to transmit a command to enable the task source to  
3 operate.

1 82. A device as defined in claim 81 in which tasks are divided into a series of task sequences, and,  
2 in response to receipt of control information enabling execution of a sequence of tasks currently  
3 being executed to be terminated , the control module is configured to enable the interface module  
4 to transmit a command to enable the task source to insert a resynchronize command in the series of  
5 tasks associated with the task sequence to enable termination of execution of the task sequence.

1 83. A device as defined in claim 81 in which tasks are divided into a series of task sequences, and,  
2 in response to receipt of control information enabling execution of a sequence of tasks at least a  
3 portion of which have been received, but which are not being executed, the control module is  
4 configured to enable the interface module to transmit a command to enable the task source to insert  
5 a resynchronize command in the series of commands to disable execution of the task sequence.

1 84. A device as defined in claim 75 in which the control module is configured to enable the user  
2 interface module interface module to transmit status information to the user interface module.

1 85. A device as defined in claim 84 in which the status information includes the execution status of  
2 at least one task.

1 86. A device as defined in claim 65 further including:

2 A. a migration information receiving module configured to receive migration information from  
3 the task source device, the migration information including a source for information

4           respecting the tasks to be distributed, timing information relative to the clock maintained by  
5           the task source device and identifications of the member devices of the synchrony group, and

6       B.     a migration control module configured to, after the migration information has been received.,

7           i.     distribute the series of tasks to the synchrony group, each task being associated with  
8                 a time stamp indicating a time, relative to the timing information that it receives from  
9                 the device operating as the task source device, at which the devices comprising the  
10                synchrony group are to execute the respective task, and

11          ii.    notify the members of the synchrony group that it is to thereafter operate as the task  
12                 source device.

1       87. A device as defined in claim 86 in which the information respecting the tasks that are to be  
2       distributed is a source of streaming information, the migration control module being configured to,  
3       after the migration information has been received, assembling the streaming information into tasks  
4       and associate each task with a said time stamp.

1       88. A device as defined in claim 86 in which the information respecting the tasks that are to be  
2       distributed is in a file identified in the migration information, the migration control module being  
3       configured to obtain information from the identified file, assemble the information into tasks and  
4       associate each task with a said time stamp.

1       89. A device as defined in claim 88 in which the information respecting the tasks that are to be  
2       distributed begins at an offset, identified in the migration information, into the identified file, the  
3       migration control module being configured to assemble the information from a position in the file  
4       associated with the identified offset.

1       90. A device as defined in claim 89 in which the information respecting the tasks that are to be  
2       distributed is in a series of files identified in the migration information, the migration control module  
3       being configured to obtain information from successive files in the series assemble the information  
4       into tasks and associate each task with as said time stamp.

1 91. A device as defined in claim 65 further including a clock rate adjustment module configured to  
2 adjust the member device's clock rate in relation to a clock rate value maintained by the task source  
3 device's clock.

1 92. A task source device for distributing a series of tasks for execution by at least one other device  
2 at respective execution times, the task source device comprising:

- 3 A. a task acquisition module configured to obtain respective ones of the tasks;
- 4 B. a task execution time determination module configured to determine a time at which each  
5 respective task is to be executed, and to associate the respective task with a time stamp  
6 indicating its execution time;
- 7 C. a task transmission module configured to transmit the series of tasks to said at least one other  
8 device; and
- 9 D. an execution control command generation module configured to, in response to a  
10 predetermined event, enable the task transmission module to insert into the series of tasks  
11 transmitted by the task transmission module a command to enable the at least one other  
12 device to modify the execution sequence of the tasks transmitted thereto.

1 93. A task source device as defined in claim 92 in which the task transmission module is configured  
2 to utilize a selected multi-cast transmission methodology.

1 94. A task source device as defined in claim 92 in which the predetermined event comprises input  
2 indicia provided by an operator.

1 95. A task source device as defined in claim 94 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the task transmission  
3 module to insert into the series of tasks transmitted by the task transmission module a command to  
4 enable the at least one other device to control execution of at least one task in relation to the time the  
5 predetermined event occurs.

1 96. A task source device as defined in claim 95 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the task transmission  
3 module to insert into the series of tasks transmitted by the task transmission module a command to  
4 enable the at least one other device to terminate execution of a task that it is currently executing  
5 and/or to not execute at least one task that is to be executed subsequent to the predetermined event.

1 97. A task source device as defined in claim 95 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a sub-set of the series of tasks, the execution control  
3 command generation module being configured to, in response to said predetermined event,

4 (i) enable the task transmission module to insert into the series of tasks transmitted by the task  
5 transmission module, a command enabling the at least one other device to terminate  
6 execution of the currently executing task and/or to not execute at least one subsequent task,  
7 if any, in the task sequence including the currently executing task; and

8 (ii) enable

9 (a) the task execution time determination module to provide that time stamps associated  
10 with tasks of task sequences subsequent to the task sequence currently being  
11 executed will reflect the termination and/or non-execution of tasks from the task  
12 sequence of the task that is currently being executed, and

13 (b) the task transmission module to transmit the tasks of the subsequent task sequences  
14 to the at least one other device.

1 98. A task source device as defined in claim 97 in which the task transmission module is configured  
2 to insert a command to enable the at least one other device to not execute all tasks in the task  
3 sequence subsequent to the terminated and/or non-executed task.

1 99. A task source device as defined in claim 92 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the task transmission  
3 module to insert into the series of tasks transmitted by the task transmission module a command to



4 enable the at least one other device to control execution of a task in relation to the task's position in  
5 the series of tasks.

1 100. A task source device as defined in claim 99 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the task transmission  
3 module to insert into the series of tasks transmitted by the task transmission module a command to  
4 enable the at least one other device to cancel execution of a task in relation to the task's position in  
5 the series of tasks.

1 101. A task source device as defined in claim 99 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the task transmission  
3 module to insert into the series of tasks transmitted by the task transmission module a command to  
4 enable the at least one other device to cancel execution of a previously-transmitted task in relation  
5 to the task's position in the series of tasks.

1 102. A task source device as defined in claim 101 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the task transmission  
3 module to insert into the series of tasks transmitted by the task transmission module a command to  
4 enable the at least one other device to cancel execution of a previously-transmitted task, in relation  
5 to the task's position in the series of tasks, for which execution has not begun.

1 103. A task source device as defined in claim 99 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a sub-set of the series of tasks, the execution control  
3 command generation module being configured to, in response to said predetermined event,

4 (i) enable the task transmission module to insert into the series of tasks transmitted by the task  
5 transmission module, a command enabling the at least one other device to cancel execution  
6 of a task sequence for which execution has not begun; and

7 (ii) enable

- 8 (a) the task execution time determination module to provide that time stamps associated  
9 with tasks of task sequences subsequent to the task sequence whose execution was  
10 cancelled will reflect the cancellation, and  
11 (b) the task transmission module to transmit the tasks of the subsequent task sequences  
12 to the at least one other device.

1 104. A task source device for distributing a series of tasks for execution by at least one other device  
2 at respective execution times, the task source device comprising:

- 3 A. a task acquisition module configured to obtain respective ones of the tasks;  
4 B. a task execution time determination module configured to determine a time at which each  
5 respective task is to be executed, and to associate the respective task with a time stamp  
6 indicating its execution time, the task execution time determination module being configured  
7 to provide, associated with at least one task, a time stamp indicating a task execution time  
8 later than the time currently indicated by a clock maintained by the task source device; and  
9 C. a task transmission module configured to transmit the series of tasks to said at least one other  
10 device.

1 105. A system as defined in claim 104 in which the task source device is configured to select the  
2 delay interval between the time indicated by the time stamp and the current time so to be sufficient  
3 to provide that the at least one task distributed by the task source device can be executed by the  
4 member devices at the time indicated by the time stamp.

1 106. A system as defined in claim 105 in which the task source device is configured to select the  
2 delay interval between the time indicated by the time stamp and the current time so to be sufficient  
3 to provide that the at least one task distributed by the task source device can be distributed to the  
4 member devices for execution at the time indicated by the time stamp

1 107. A system as defined in claim 104 in which task source device is configured to obtain  
2 information associated with the tasks from at least two types of information sources, the task source

device being further configured to select, for each task the delay interval between the time indicated by the time stamp and the current time based on the information source type that is associated with the respective task.

108. A task source device for distributing a series of tasks for execution by at least one other device, the task source device comprising:

- A. a task acquisition module configured to obtain respective ones of the tasks;
- B. a task execution time determination module configured to determine a time at which each respective task is to be executed, and to associate the respective task with a time stamp indicating its execution time;
- C. a task transmission module configured to transmit the series of tasks to said at least one other device; and
- D. a task source device migration control module configured to, in response to a predetermined event, provide migration information to another device, the migration information including a source for information respecting the tasks to be distributed, timing information relative to the clock maintained by the task source device and identifications of the member devices of the synchrony group.

109. A method of operating a system comprising plurality of devices, one of the devices operating as a task source device and at least one other device operating as a member of a synchrony group,

- A. the task source device being enabled to distribute a series of tasks to the synchrony group, each task being associated with a time stamp indicating a time, relative to a clock maintained by the task source device, at which the devices comprising the synchrony group are to execute the respective task;
- B. each member device being enabled to:
  - (i) periodically obtain from the task source device an indication of a current time value indicated by the task source device's clock, and
  - (ii) determine, from the time stamp associated with each respective task and a time differential value representing a difference between the current time value indicated

12 by the task source device's clock, and a current time value indicated by its respective  
13 clock, a time, relative to its respective clock, at which it is to execute the task.

1 110. A method as defined in claim 109 in which the synchrony group comprises a plurality of  
2 member devices.

1 111. A method as defined in claim 110 in which each device comprising a member of the synchrony  
2 group is further enabled to execute each task that it receives from the task source device at the  
3 determined time, thereby to facilitate execution by them of respective tasks in the series in respective  
4 timing relationships relative to the time indicated by the task source device's clock.

1 112. A method as defined in claim 111 in which the member devices are enabled to execute  
2 respective tasks in synchrony.

1 113. A method as defined in claim 110 in which one of the member devices operates as a master  
2 device for the synchrony group, any other member devices comprising respective slave devices, the  
3 master device being enabled to perform at least one type of synchrony group management operation  
4 in connection with the member devices comprising the synchrony group.

1 114. A method as defined in claim 113 further including a user interface module enabled to control  
2 the master device's performance of said at least one type of synchrony group management operation,  
3 the master device being further enabled to provide status information relating to the status of the  
4 synchrony group to the user interface module.

1 115. A method as defined in claim 114 in which the status information includes identifications of  
2 the devices comprising the synchrony group.

1 116. A method as defined in claim 114 in which the status information includes an identification of  
2 the task currently being executed.

1 117. A method as defined in claim 113, the method comprising at least one additional device, in  
2 which, in one type of synchrony group management operation, the master device is enabled to enable  
3 the at least one additional device to join the synchrony group as a slave device.

1 118. A method as defined in claim 117 in which the task source device is enabled to distribute tasks  
2 to the member devices using a selected multi-cast transmission methodology, the member devices  
3 being enabled to buffer the tasks until they are to be executed, and further in which, when the at least  
4 one additional device joins the synchrony group as a slave device, the task source device is enabled  
5 to transmit at least one previously distributed task to the slave device using a selected unicast  
6 transmission methodology.

1 119. A method as defined in claim 113 in which, in at least one type of synchrony group  
2 management operation, the master device is enabled to enable the task source device to join the  
3 synchrony group as a slave device, the task source device continuing to operate as the task source  
4 device for the synchrony group.

1 120. A method as defined in claim 113 in which, in at least one type of synchrony group  
2 management operation, the master device is enabled to enable a slave device to disengage from the  
3 synchrony group, the disengaged slave device thereafter not being a member device in the synchrony  
4 group.

1 121. A method as defined in claim 113 in which, in at least one type of synchrony group  
2 management operation, the master device is enabled to control the series of tasks to be distributed  
3 by the task source device.

1 122. A method as defined in claim 113 in which, in at least one type of synchrony group  
2 management operation, the master device is further enabled to control execution by the member  
3 devices of the tasks that have been distributed by the task source device.

1 123. A method as defined in claim 122 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a sub-set of the series of tasks, and further in which in  
3 at least one type of synchrony group management operation, the master device is enabled to enable  
4 the member devices to terminate execution of a task sequence that is currently being executed.

1 124. A method as defined in claim 123 in which, in the synchrony group management operation  
2 enabling the member devices to terminate execution of a task sequence that is currently being  
3 executed, the master device enables the task source device to distribute a command to enable the  
4 member devices to terminate execution of the task sequence, the member devices being enabled to,  
5 after receiving the command, terminating execution of the task sequence.

1 125. A method as defined in claim 122 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a sub-set of the series of tasks, and further in which at  
3 least one type of synchrony group management operation, the master device is enabled to enable the  
4 member devices to cancel execution of a task sequence that has been previously distributed, but for  
5 which execution has not begun.

1 126. A method as defined in claim 125 in which, in the synchrony group management operation  
2 enabling the member devices to cancel execution of a task sequence that has been previously  
3 distributed but for which execution has not begun, the master device enables the task source device  
4 to distribute a command to enable the member devices to cancel execution of the task sequence, the  
5 member devices being enabled to, after receiving the command, cancel execution of the task  
6 sequence.

1 127. A method as defined in claim 113 in which, in at least one type of synchrony group  
2 management operation, the member device operating as the master device is enabled to enable the  
3 master device to migrate from one member device to another member device in the synchrony group.

1 128. A method as defined in claim 113 in which, in at least one type of synchrony group  
2 management operation, the master device is enabled to perform the step of enabling the task source  
3 device to migrate from one device to another device in the system.

1 129. A method as defined in claim 128 in which

2 A. the device operating as the task source device is enable to perform the step of, after being  
3 enabled to migrate the task source device to said other device, providing migration  
4 information to the other device, the migration information including a source for information  
5 respecting the tasks to be distributed, timing information relative to the clock maintained by  
6 the task source device and identifications of the member devices,

7 B. the other device is enabled to, after receiving the migration information, perform the steps  
8 of

- 9 i. distributing the series of tasks to the synchrony group, each task being associated  
10 with a time stamp indicating a time, relative to the timing information that it receives  
11 from the device operating as the task source device, at which the devices comprising  
12 the synchrony group are to execute the respective task, and  
13 ii. notifying the members of the synchrony group that it is to thereafter operate as the  
14 task source device.

1 130. A method as defined in claim 129 in which the information respecting the tasks that are to be  
2 distributed is a source of streaming information, the other device being enabled to, after receiving  
3 the migration information, perform the steps of assembling the streaming information into tasks and  
4 associating each task with a said time stamp.

1 131. A method as defined in claim 129 in which the information respecting the tasks that are to be  
2 distributed is in a file identified in the migration information, the other device being enabled to  
3 perform the steps of obtaining information from the identified file, assembling the information into  
4 tasks and associating each task with a said time stamp.

1 132. A method as defined in claim 131 in which the information respecting the tasks that are to be  
2 distributed begins at an offset, identified in the migration information, into the identified file, the  
3 other device being enabled to perform the step of assembling the information from a position in the  
4 file associated with the identified offset.

1 133. A method as defined in claim 131 in which the information respecting the tasks that are to be  
2 distributed is in a series of files identified in the migration information, the other device being  
3 enabled to perform the step of obtaining information from successive files in the series assemble the  
4 information into tasks and associate each task with as said time stamp.

1 134. A method as defined in claim 109 in which the task source device is further enabled to  
2 distribute the tasks using a selected multi-cast message transmission methodology.

1 135. A method as defined in claim 109 in which the task source device is enabled to perform the step  
2 of providing, provide, associated with at least one task, a time stamp indicating a task execution time  
3 later than the time currently indicated by the clock maintained by the task source device.

1 136. A method as defined in claim 135 in which the task source device is enabled to perform the step  
2 of selecting the delay interval between the time indicated by the time stamp and the current time so  
3 to be sufficient to provide that the at least one task distributed by the task source device can be  
4 executed by the member devices at the time indicated by the time stamp.

1 137. A method as defined in claim 136 in which the task source device is enabled to perform the step  
2 of selecting the delay interval between the time indicated by the time stamp and the current time so  
3 to be sufficient to provide that the at least one task distributed by the task source device can be  
4 distributed to the member devices for execution at the time indicated by the time stamp

1 138. A method as defined in claim 135 in which task source device is enabled to perform the steps  
2 of obtaining information associated with the tasks from at least two types of information sources,



3 and selecting, for each task, the delay interval between the time indicated by the time stamp and the  
4 current time based on the information source type that is associated with the respective task.

1 139. A method as defined in claim 109 in which at least one member device is further enabled to  
2 perform the step of adjusting its clock rate in relation to a clock rate value maintained by the task  
3 source device's clock.

1 140. A method as defined in claim 139 in which the at least one member device is enabled to  
2 perform the step of adjusting its clock rate in relation to time stamps associated with respective ones  
3 of the tasks received from the task source device.

1 141. A method as defined in claim 109 in which at least one other device operates as a task source  
2 device enabled to distribute tasks to a second synchrony group, the device operating as the task  
3 source device for the first synchrony group also operating as a member device of a second synchrony  
4 group.

1 142. A method as defined in claim 109 including, within a member device,

2 A. a task receiving step of receiving the series of tasks,

3 B. a current time retrieval step of obtaining, from the task source device, the current time value  
4 as indicated by the task source's clock;

5 C. an execution time determination step of determining, from the time stamp associated with  
6 each respective task and a time differential value representing a difference between the  
7 current time value obtained during the current time retrieval step and a current time value  
8 indicated by a clock maintained by the device, a time, relative to the member device's  
9 respective clock at which the task is to be executed; and

10 D. a task execution step of executing each respective task at the time determined during the  
11 execution time determination step.

1 143. A method as defined in claim 142 further including a control step for controlling execution of  
2 commands received during the task receiving step

1 144. A method as defined in claim 143 in which the at least one member device further comprises  
2 a buffer configured to buffer tasks received from the task source device during the task receiving step  
3 until they are to be executed, the task execution step including the step of executing the buffered  
4 tasks at the times determined during the execution time determination step.

1 145. A method as defined in claim 144 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a subset of the series of tasks, the task receiving step  
3 being further enabled to receive task execution control commands for controlling task execution, the  
4 control step including the step of, in response to receipt of at least one task execution control  
5 command for controlling task execution, controlling the task execution step to terminate execution  
6 of a task sequence currently being executed, and further to not execute subsequent tasks in the task  
7 sequence that have been buffered.

1 146. A method as defined in claim 145 in which the control step includes the step of enabling the  
2 task execution step to resume execution of at least one task associated with a subsequent task  
3 sequence at a time determined during the execution time determination step.

1 147. A method as defined in claim 144 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a subset of the series of tasks, the task receiving step  
3 including the step of receiving task execution control commands for controlling task execution, the  
4 control step including the step of, in response to receipt of at least one task execution control  
5 command to cancel execution of a task sequence for which at least one task has been buffered but  
6 for which execution has not begun, providing that tasks from that task sequence that have been  
7 buffered not be executed.

1 148. A method as defined in claim 147 in which the control step includes the step of enabling  
2 execution to resume of at least one task associated with a task sequence subsequent to the task  
3 sequence for which at least one task has been buffered but for which execution has not begun.

1 149. A method as defined in claim 142 in which the member device performs:

- 2 A. migration information receiving step of receiving migration information from the task source  
3 device, the migration information including a source for information respecting the tasks to  
4 be distributed, timing information relative to the clock maintained by the task source device  
5 and identifications of the member devices of the synchrony group, and  
6 B. a migration control step of, after the migration information has been received.,  
7 i. distributing the series of tasks to the synchrony group, each task being associated  
8 with a time stamp indicating a time, relative to the timing information that it receives  
9 from the device operating as the task source device, at which the devices comprising  
10 the synchrony group are to execute the respective task, and  
11 ii. notifying the members of the synchrony group that it is to thereafter operate as the  
12 task source device.

1 150. A method as defined in claim 149 in which the information respecting the tasks that are to be  
2 distributed is a source of streaming information, the migration control step includes the steps of, after  
3 the migration information has been received, assembling the streaming information into tasks and  
4 associating each task with a said time stamp.

1 151. A method as defined in claim 149 in which the information respecting the tasks that are to be  
2 distributed is in a file identified in the migration information, the migration control step including  
3 the steps of obtaining information from the identified file, assembling the information into tasks and  
4 associating each task with a said time stamp.

1 152. A method as defined in claim 151 in which the information respecting the tasks that are to be  
2 distributed begins at an offset, identified in the migration information, into the identified file, the

3 migration control step including the step of assembling the information from a position in the file  
4 associated with the identified offset.

1 153. A method as defined in claim 151 in which the information respecting the tasks that are to be  
2 distributed is in a series of files identified in the migration information, the migration control step  
3 including the steps of obtaining information from successive files in the series assemble the  
4 information into tasks and associating each task with as said time stamp.

1 154. A method as defined in claim 142 in which the member device is further enabled to perform  
2 a clock rate adjustment step including the step of adjusting the member device's clock rate in relation  
3 to a clock rate value maintained by the task source device's clock.

1 155. A method as defined in claim 154 in which the clock rate adjustment step includes the step of  
2 determining adjust the clock rate in relation to time stamps associated with respective ones of the  
3 tasks received from the task source device.

1 156. A method as defined in claim 109 including, within a task source device,

2 A. a task acquisition step of obtaining respective ones of the tasks;

3 B. a task execution time determination step of determining a time at which each respective task  
4 is to be executed, and to associate the respective task with a time stamp indicating its  
5 execution time;

6 C. a task transmission step of transmitting the series of tasks to said at least one other device;  
7 and

8 D. an execution control command generation step of, in response to a predetermined event and  
9 during the task transmission step, the insertion into the series of tasks transmitted by the task  
10 transmission module of a command to enable the at least one other device to modify the  
11 execution sequence of the tasks transmitted thereto.

1 157. A method as defined in claim 156 in which the task transmission step includes the step of  
2 utilizing a selected multi-cast transmission methodology.

1 158. A method as defined in claim 156 in which the predetermined event includes the step of  
2 receiving input indicia provided by an operator.

1 159. A method as defined in claim 158 in which the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the task  
3 transmission step, the insertion into the series of tasks of a command to enable the at least one other  
4 device to control execution of at least one task in relation to the time the predetermined event occurs.

1 160. A method as defined in claim 159 in which, the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the task  
3 transmission step, the insertion into the series of tasks of a command to enable the at least one other  
4 device to terminate execution of a task that it is currently executing and/or to not execute at least one  
5 task that is to be executed subsequent to the predetermined event.

1 161. A method as defined in claim 159 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a sub-set of the series of tasks, the execution control  
3 command generation step including the steps of, in response to said predetermined event,

4 (i) enabling during the task transmission step the insertion, into the series of tasks, of a  
5 command enabling the at least one other device to terminate execution of the currently  
6 executing task and/or to not execute at least one subsequent task, if any, in the task sequence  
7 including the currently executing task; and

8 (ii) enabling

9 (a) during the task execution time determination step, that time stamps associated with  
10 tasks of task sequences subsequent to the task sequence currently being executed will  
11 reflect the termination and/or non-execution of tasks from the task sequence of the  
12 task that is currently being executed, and

13           (b)     during the task transmission step, the transmission of the tasks of the subsequent task  
14                   sequences to the at least one other device.

1     162. A method as defined in claim 161 in which the task transmission step includes the step of  
2     inserting a command into the task sequence to enable the at least one other device to not execute all  
3     tasks in the task sequence subsequent to the terminated and/or non-executed task.

1     163. A method as defined in claim 159 in which the execution control command generation step  
2     include the step of enabling, in response to said predetermined event and during the task  
3     transmission step, the insertion into the series of tasks of a command to enable the at least one other  
4     device to control execution of a task in relation to the task's position in the series of tasks.

1     164. A method as defined in claim 163 in which the execution control command generation step  
2     includes the step of, in response to said predetermined event and during the task transmission step,  
3     the insertion into the series of tasks of a command to enable the at least one other device to cancel  
4     execution of a task in relation to the task's position in the series of tasks.

1     165. A method as defined in claim 163 in which the execution control command generation step  
2     includes the step of enabling, in response to said predetermined event and during the task  
3     transmission step, the inserting into the series of tasks of a command to enable the at least one other  
4     device to cancel execution of a previously-transmitted task in relation to the task's position in the  
5     series of tasks.

1     166. A method as defined in claim 165 in which, the execution control command generation step  
2     includes the step of, in response to said predetermined event and during the task transmission step,  
3     the insertion into the series of tasks of a command to enable the at least one other device to cancel  
4     execution of a previously-transmitted task, in relation to the task's position in the series of tasks, for  
5     which execution has not begun.

1 167. A method as defined in claim 163 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a sub-set of the series of tasks, the execution control  
3 command generation step including the steps of, in response to said predetermined event,

4 (i) enabling, during the task transmission step, the insertion, into the series of tasks, of a  
5 command enabling the at least one other device to cancel execution of a task sequence for  
6 which execution has not begun; and

7 (ii) enabling

8 (a) during the task execution time determination step, that time stamps associated with  
9 tasks of task sequences subsequent to the task sequence whose execution was  
10 cancelled will reflect the cancellation, and

11 (b) during the task transmission step, the transmission of the tasks of the subsequent task  
12 sequences to the at least one other device.

1 168. A method as defined in claim 109 in which the task source device is enabled to perform

2 A. a task acquisition step of obtaining respective ones of the tasks;

3 B. a task execution time determination step of determining a time at which each respective task  
4 is to be executed, and to associate the respective task with a time stamp indicating its  
5 execution time;

6 C. a task transmission step of transmitting the series of tasks to said at least one other device;  
7 and

8 D. a task source device migration control step of, in response to a predetermined event,  
9 providing migration information to another device, the migration information including a  
10 source for information respecting the tasks to be distributed, timing information relative to  
11 the clock maintained by the task source device and identifications of the member devices of  
12 the synchrony group.

1 169. A method as defined in claim 109 in which the task source device is enabled to perform the step  
2 of providing, associated with at least one task, a time stamp indicating a task execution time later  
3 than the time currently indicated by the clock maintained by the task source device.

1 170. A method as defined in claim 169 in which the task source device is enabled to perform the step  
2 of selecting the delay interval between the time indicated by the time stamp and the current time so  
3 to be sufficient to provide that the at least one task distributed by the task source device can be  
4 executed by the member devices at the time indicated by the time stamp.

1 171. A method as defined in claim 170 in which the task source device is enabled to perform the step  
2 of selecting the delay interval between the time indicated by the time stamp and the current time so  
3 to be sufficient to provide that the at least one task distributed by the task source device can be  
4 distributed to the member devices for execution at the time indicated by the time stamp

1 172. A method as defined in claim 169 in which task source device is enabled to perform the step  
2 of obtaining information associated with the tasks from at least two types of information sources,  
3 and selecting for each task the delay interval between the time indicated by the time stamp and the  
4 current time based on the information source type that is associated with the respective task.

1 173. A method of operating a device for executing a series of tasks provided by a task source at  
2 times specified by the task source in relation to a clock maintained by the task source, the method  
3 including

- 4 A. a task receiving step of receiving the series of tasks, each task being associated with a time  
5 stamp, each time stamp indicating a time value relative to a time indicated a clock  
6 maintained by the task source, at which the device is to execute the respective task;
- 7 B. a current time retrieval module of obtaining, from the task source, a current time value as  
8 indicated by the task source's clock;
- 9 C. an execution time determination step of determining, from the time stamp associated with  
10 each respective task and a time differential value representing a difference between the  
11 current time value obtained during the current time retrieval step and a current time value  
12 indicated by a clock maintained by the device, a time, relative to the device's respective  
13 clock, at which the task is to be executed; and



14 D. a task execution module step of executing each respective task at the time determined during  
15 the execution time determination step.

1 174. A method as defined in claim 173 further including a control step for controlling execution of  
2 commands received by said interface module.

1 175. A method as defined in claim 174 further comprising a buffer configured to buffer tasks that  
2 have been received until they are to be executed, the task execution step including the step of  
3 executing the buffered tasks at the times determined during the execution time determination step.

1 176. A method as defined in claim 175 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a subset of the series of tasks, the interface module  
3 being further enabled to receive task execution control commands for controlling task execution, the  
4 control module being enabled to, in response to receipt of at least one task execution control  
5 command for controlling task execution, enable the task execution module to terminate execution  
6 of a task sequence currently being executed, being enabled to not execute subsequent tasks in the  
7 task sequence that have been buffered.

1 177. A method as defined in claim 176 in which the control step includes the step of enabling task  
2 execution to resume execution with at least one task associated with a subsequent task sequence at  
3 a time determined during the execution time determination step.

1 178. A method as defined in claim 175 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a subset of the series of tasks, the task receiving step  
3 including the step of receiving task execution control commands for controlling task execution, the  
4 control step, in response to receipt of at least one task execution control command to cancel  
5 execution of a task sequence for which at least one task has been buffered but for which execution  
6 has not begun, including the step of providing that task execution not including execution of tasks  
7 from that task sequence that have been buffered.

1 179. A method as defined in claim 178 in which the control step includes the step of enabling task  
2 execution to resume execution of at least one task associated with a task sequence subsequent to the  
3 task sequence for which at least one task has been buffered but for which execution has not begun.

1 180. A method as defined in claim 173, the control step including the step of, in response to receipt  
2 of a command to become a member of a synchrony group, receiving tasks during the task receiving  
3 step for execution during the task execution step.

1 181. A method as defined in claim 180 in which the control step includes the step of, in response to  
2 receipt of a command to become a member of a synchrony group, enable the task receiving step to  
3 include the step of receiving tasks currently being transmitted using a selected multi-cast  
4 transmission methodology, and further to include the step of retrieving at least one previously  
5 distributed task using a selected unicast transmission methodology.

1 182. A method as defined in claim 173 in which the control step includes the steps of, in receipt of  
2 a command to disengage from a synchrony group, disabling the receipt of tasks and the execution  
3 of previously-received tasks that have not yet been executed.

1 183. A method as defined in claim 173 further comprising a user interface module control  
2 information receiving step of receiving control information from a user interface module, the control  
3 step including the step of enabling selected operations to be performed in response to the control  
4 information.

1 184 A method as defined in claim 183 in which, in response to control information to enable another  
2 device to become a member of the device's synchrony group, the control step includes the step of  
3 transmitting a command to the other device to enable the other device to become a member of the  
4 synchrony group.

1 185. A method as defined in claim 183 in which, in response to control information to enable another  
2 device that is a member of the device's synchrony group to disengage from the synchrony group, the  
3 control module enables the interface module to transmit a command to the other device to enable the  
4 other device to disengage from the synchrony group.

1 186. A method as defined in claim 185 in which, in response to control information to enable the  
2 task source to begin operating, the control step includes the step of performing selected operations  
3 to enable the task source to begin operating.

1 187. A method as defined in claim 186, the device also operating as the task source, the method  
2 including a task generation steps of, under control of the control step, obtaining information from  
3 which the tasks are to be generated and generating the tasks.

1 188. A method as defined in claim 187 further including the step of transmitting the tasks to at least  
2 one other device.

1 189. A method as defined in claim 187 in which the device is not the task source, the control step  
2 including the step of enabling the transmission of a command to enable the task source to operate.

1 190. A method as defined in claim 189 in which tasks are divided into a series of task sequences,  
2 and, in response to receipt of control information enabling execution of a sequence of tasks currently  
3 being executed to be terminated, the control step includes the step of transmitting a command to  
4 enable the task source to insert a resynchronize command in the series of tasks associated with the  
5 task sequence to enable termination of execution of the task sequence.

1 191. A method as defined in claim 189 in which tasks are divided into a series of task sequences,  
2 and, in response to receipt of control information enabling execution of a sequence of tasks at least  
3 a portion of which have been received, but which are not being executed, the control step includes

4 the step of transmitting a command to enable the task source to insert a resynchronize command in  
5 the series of commands to disable execution of the task sequence.

1 192. A method as defined in claim 174 in which the control step includes the step of transmitting  
2 status information to the user interface module.

1 193. A method as defined in claim 192 in which the status information includes the execution status  
2 of at least one task.

1 194. A method as defined in claim 173 in which the member device performs:

- 2 A. migration information receiving step of receiving migration information from the task source  
3 device, the migration information including a source for information respecting the tasks to  
4 be distributed, timing information relative to the clock maintained by the task source device  
5 and identifications of the member devices of the synchrony group, and  
6 B. a migration control step of, after the migration information has been received.,  
7 i. distributing the series of tasks to the synchrony group, each task being associated  
8 with a time stamp indicating a time, relative to the timing information that it receives  
9 from the device operating as the task source device, at which the devices comprising  
10 the synchrony group are to execute the respective task, and  
11 ii. notifying the members of the synchrony group that it is to thereafter operate as the  
12 task source device.

1 195. A method as defined in claim 194 in which the information respecting the tasks that are to be  
2 distributed is a source of streaming information, the migration control step includes the steps of, after  
3 the migration information has been received, assembling the streaming information into tasks and  
4 associating each task with a said time stamp.

1 196. A method as defined in claim 194 in which the information respecting the tasks that are to be  
2 distributed is in a file identified in the migration information, the migration control step including

3 the steps of obtaining information from the identified file, assembling the information into tasks and  
4 associating each task with a said time stamp.

1 197. A method as defined in claim 196 in which the information respecting the tasks that are to be  
2 distributed begins at an offset, identified in the migration information, into the identified file, the  
3 migration control step including the step of assembling the information from a position in the file  
4 associated with the identified offset.

1 198. A method as defined in claim 196 in which the information respecting the tasks that are to be  
2 distributed is in a series of files identified in the migration information, the migration control step  
3 including the steps of obtaining information from successive files in the series assemble the  
4 information into tasks and associating each task with as said time stamp.

1 199. A method as defined in claim 173 in which the member device is further enabled to perform  
2 a clock rate adjustment step including the step of adjusting the member device's clock rate in relation  
3 to a clock rate value maintained by the task source device's clock.

1 200. A method as defined in claim 199 in which the clock rate adjustment step includes the step of  
2 determining adjust the clock rate in relation to time stamps associated with respective ones of the  
3 tasks received from the task source device.

1 201. A method of operating a device for distributing a series of tasks for execution by at least one  
2 other device at respective execution times, the method comprising:

- 3 A. a task acquisition step of obtaining respective ones of the tasks;
- 4 B. a task execution time determination step of determining a time at which each respective task  
5 is to be executed, and to associate the respective task with a time stamp indicating its  
6 execution time;
- 7 C. a task transmission step of transmitting the series of tasks to said at least one other device;  
8 and

9 D. an execution control command generation step of, in response to a predetermined event and  
10 during the task transmission step, the insertion into the series of tasks transmitted by the task  
11 transmission module of a command to enable the at least one other device to modify the  
12 execution sequence of the tasks transmitted thereto.

1 202. A method as defined in claim 201 in which the task transmission step includes the step of  
2 utilizing a selected multi-cast transmission methodology.

1 203. A method as defined in claim 201 in which the predetermined event includes the step of  
2 receiving input indicia provided by an operator.

1 204. A method as defined in claim 203 in which the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the task  
3 transmission step, the insertion into the series of tasks of a command to enable the at least one other  
4 device to control execution of at least one task in relation to the time the predetermined event occurs.

1 205. A method as defined in claim 204 in which, the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the task  
3 transmission step, the insertion into the series of tasks of a command to enable the at least one other  
4 device to terminate execution of a task that it is currently executing and/or to not execute at least one  
5 task that is to be executed subsequent to the predetermined event.

1 206. A method as defined in claim 203 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a sub-set of the series of tasks, the execution control  
3 command generation step including the steps of, in response to said predetermined event,

4 (i) enabling during the task transmission step the insertion, into the series of tasks, of a  
5 command enabling the at least one other device to terminate execution of the currently  
6 executing task and/or to not execute at least one subsequent task, if any, in the task sequence  
7 including the currently executing task; and

8 (ii) enabling

9 (a) during the task execution time determination step, that time stamps associated with  
10 tasks of task sequences subsequent to the task sequence currently being executed will  
11 reflect the termination and/or non-execution of tasks from the task sequence of the  
12 task that is currently being executed, and

13 (b) during the task transmission step, the transmission of the tasks of the subsequent task  
14 sequences to the at least one other device.

1 207. A method as defined in claim 206 in which the task transmission step includes the step of  
2 inserting a command into the task sequence to enable the at least one other device to not execute all  
3 tasks in the task sequence subsequent to the terminated and/or non-executed task.

1 208. A method as defined in claim 201 in which the execution control command generation step  
2 include the step of enabling, in response to said predetermined event and during the task  
3 transmission step, the insertion into the series of tasks of a command to enable the at least one other  
4 device to control execution of a task in relation to the task's position in the series of tasks.

1 209. A method as defined in claim 208 in which the execution control command generation step  
2 includes the step of, in response to said predetermined event and during the task transmission step,  
3 the insertion into the series of tasks of a command to enable the at least one other device to cancel  
4 execution of a task in relation to the task's position in the series of tasks.

1 210. A method as defined in claim 208 in which the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the task  
3 transmission step, the inserting into the series of tasks of a command to enable the at least one other  
4 device to cancel execution of a previously-transmitted task in relation to the task's position in the  
5 series of tasks.

1 211. A method as defined in claim 210 in which, the execution control command generation step  
2 includes the step of, in response to said predetermined event and during the task transmission step,  
3 the insertion into the series of tasks of a command to enable the at least one other device to cancel  
4 execution of a previously-transmitted task, in relation to the task's position in the series of tasks, for  
5 which execution has not begun.

1 212. A method as defined in claim 208 in which the series of tasks includes a series of task  
2 sequences with each task sequence including a sub-set of the series of tasks, the execution control  
3 command generation step including the steps of, in response to said predetermined event,

4 (i) enabling, during the task transmission step, the insertion, into the series of tasks, of a  
5 command enabling the at least one other device to cancel execution of a task sequence for  
6 which execution has not begun; and

7 (ii) enabling

8 (a) during the task execution time determination step, that time stamps associated with  
9 tasks of task sequences subsequent to the task sequence whose execution was  
10 cancelled will reflect the cancellation, and

11 (b) during the task transmission step, the transmission of the tasks of the subsequent task  
12 sequences to the at least one other device.

1 213. A method of operating a device for distributing a series of tasks for execution by at least one  
2 other device at respective execution times, the method comprising:

3 A. a task acquisition step of obtaining respective ones of the tasks;

4 B. a task execution time determination step of determining a time at which each respective task  
5 is to be executed, and to associating the respective task with a time stamp indicating its  
6 execution time, the task execution time determination step including the step of providing,  
7 associated with at least one task, a time stamp indicating a task execution time later than the  
8 time currently indicated by a clock maintained by the task source device; and

9 C. a task transmission step of transmitting the series of tasks to said at least one other device.



1 214. A method as defined in claim 213 in which the task execution time determination step includes  
2 the step of selecting the delay interval between the time indicated by the time stamp and the current  
3 time so to be sufficient to provide that the at least one task distributed by the device can be executed  
4 by at least one other device at the time indicated by the time stamp.

1 215. A method as defined in claim 214 in which the task execution time determination step includes  
2 the step of selecting the delay interval between the time indicated by the time stamp and the current  
3 time so to be sufficient to provide that the at least one task distributed by the device can be  
4 distributed to other devices over a network for execution by the other devices at the time indicated  
5 by the time stamp.

1 216. A method as defined in claim 213 in which task acquisition step includes the step of obtaining  
2 information associated with the tasks from at least two types of information sources, the task  
3 execution time determination step including the step of selecting, for each task the delay interval  
4 between the time indicated by the time stamp and the current time based on the information source  
5 type that is associated with the respective task.

1 217. A method of operating a device for distributing a series of tasks for execution by at least one  
2 other device, the method comprising:

- 3 A. a task acquisition module configured to obtain respective ones of the tasks;
- 4 B. a task execution time determination module configured to determine a time at which each  
5 respective task is to be executed, and to associate the respective task with a time stamp  
6 indicating its execution time;
- 7 C. a task transmission module configured to transmit the series of tasks to said at least one other  
8 device; and
- 9 D. a task source device migration control module configured to, in response to a predetermined  
10 event, provide migration information to another device, the migration information including  
11 a source for information respecting the tasks to be distributed, timing information relative

12 to the clock maintained by the task source device and identifications of the member devices  
13 of the synchrony group.

1 218. A computer program product for use in connection with a computer to provide a device for  
2 executing a series of tasks provided by a task source at times specified by the task source in relation  
3 to a clock maintained by the task source, the computer program product comprising a computer-  
4 readable medium having encoded thereon:

- 5 A. an interface module configured to enable the computer to receive the series of tasks, each  
6 task being associated with a time stamp, each time stamp indicating a time value relative to  
7 a time indicated a clock maintained by the task source, at which the device is to execute the  
8 respective task;
- 9 B. a current time retrieval module configured to enable the computer to obtain, from the task  
10 source, a current time value as indicated by the task source's clock;
- 11 C. an execution time determination module configured to enable the computer to determine,  
12 from the time stamp associated with each respective task and a time differential value  
13 representing a difference between the current time value obtained by the current time  
14 retrieval module and a current time value indicated by a clock maintained by the device, a  
15 time, relative to the device's respective clock, at which the task is to be executed; and
- 16 D. a task execution module configured to enable the computer to execute each respective task  
17 at the time determined by the execution time determination module.

1 219. A computer program product as defined in claim 218 further including a control module for  
2 enabling said computer to control execution of commands received by the interface module.

1 220. A computer program product as defined in claim 219 further comprising a buffer module  
2 configured to enable the computer to buffer tasks received by the interface module until they are to  
3 be executed, the task execution module being configured to enable the computer to execute the  
4 buffered tasks at the times determined by the execution time determination module.

1 221. A computer program product as defined in claim 220 in which the series of tasks includes a  
2 series of task sequences with each task sequence including a subset of the series of tasks, the  
3 interface module being further configured to enable the computer to receive task execution control  
4 commands for controlling task execution, the control module being configured to enable the  
5 computer to, in response to receipt of at least one task execution control command for controlling  
6 task execution, enable the task execution module to terminate execution of a task sequence currently  
7 being executed, being configured to enable the computer to not execute subsequent tasks in the task  
8 sequence that have been buffered.

1 222. A computer program product as defined in claim 220 in which the control module is configured  
2 to enable the computer to enable the task execution module to resume execution of at least one task  
3 associated with a subsequent task sequence at a time determined by the execution time determination  
4 module.

1 223. A computer program product as defined in claim 219 in which the series of tasks includes a  
2 series of task sequences with each task sequence including a subset of the series of tasks, the  
3 interface module being further configured to enable the computer to receive task execution control  
4 commands for controlling task execution, the control module being configured to enable the  
5 computer to, in response to receipt of at least one task execution control command to cancel  
6 execution of a task sequence for which at least one task has been buffered but for which execution  
7 has not begun, enable the task execution module to not execute tasks from that task sequence that  
8 have been buffered.

1 224. A computer program product as defined in claim 223 in which the control module is configured  
2 to enable the computer to enable the task execution module to resume execution of at least one task  
3 associated with a task sequence subsequent to the task sequence for which at least one task has been  
4 buffered but for which execution has not begun.

1 225. A computer program product as defined in claim 219, the control module being configured to  
2 enable the computer to, in response to receipt of a command to become a member of a synchrony  
3 group, enable the interface module to receive tasks for execution by the task execution module.

1 226. A computer program product as defined in claim 225 in which the control module is configured  
2 to enable the computer to, in response to receipt of a command to become a member of a synchrony  
3 group, enable the interface module to receive tasks currently being transmitted using a selected  
4 multi-cast transmission methodology, and further to retrieve at least one previously distributed task  
5 using a selected unicast transmission methodology.

1 227. A computer program product as defined in claim 219 in which the control module is configured  
2 to enable the computer to, in receipt of a command to disengage from a synchrony group, disable  
3 the interface module from receiving tasks and the task execution module from executing previously  
4 received tasks that have not yet been executed.

1 228. A computer program product as defined in claim 219 further comprising a user interface  
2 module interface module configured to receive control information from a user interface module,  
3 the control module being configured to enable the computer to enable selected operations to be  
4 performed in response to the control information.

1 229. A computer program product as defined in claim 228 in which, in response to control  
2 information to enable another device to become a member of the device's synchrony group, the  
3 control module enables the interface module to transmit a command to the other device to enable the  
4 other device to become a member of the synchrony group.

1 230. A computer program product as defined in claim 228 in which, in response to control  
2 information to enable another device that is a member of the device's synchrony group to disengage  
3 from the synchrony group, the control module enables the interface module to transmit a command  
4 to the other device to enable the other device to disengage from the synchrony group.

1 231. A computer program product as defined in claim 228 in which, in response to control  
2 information to enable the task source to begin operating, the control module performs selected  
3 operations to enable the task source to begin operating.

1 232. A computer program product as defined in claim 231, the device also operating as the task  
2 source, the device including a task generator module configured to enable the computer to, under  
3 control of the control module, obtain information from which the tasks are to be generated and  
4 generate the tasks.

1 233. A computer program product as defined in claim 232 in which the interface module is further  
2 configured to enable the computer to transmit the tasks to at least one other device.

1 234. A computer program product as defined in claim 232 in which the device is not the task source,  
2 the control module being configured to enable the computer to enable the interface module to  
3 transmit a command to enable the task source to operate.

1 235. A computer program product as defined in claim 234 in which tasks are divided into a series  
2 of task sequences, and, in response to receipt of control information enabling execution of a  
3 sequence of tasks currently being executed to be terminated, the control module is configured to  
4 enable the computer to enable the interface module to transmit a command to enable the task source  
5 to insert a resynchronize command in the series of tasks associated with the task sequence to enable  
6 termination of execution of the task sequence.

1 236. A computer program product as defined in claim 234 in which tasks are divided into a series  
2 of task sequences, and, in response to receipt of control information enabling execution of a  
3 sequence of tasks at least a portion of which have been received, but which are not being executed,  
4 the control module is configured to enable the computer to enable the interface module to transmit

5 a command to enable the task source to insert a resynchronize command in the series of commands  
6 to disable execution of the task sequence.

1 237. A computer program product as defined in claim 228 in which the control module is configured  
2 to enable the computer to enable the user interface module interface module to transmit status  
3 information to the user interface module.

1 238. A computer program product as defined in claim 237 in which the status information includes  
2 the execution status of at least one task.

1 239. A computer program product as defined in claim 218 further including:

- 2 A. a migration information receiving module configured to enable the computer to receive  
3 migration information from the task source device, the migration information including a  
4 source for information respecting the tasks to be distributed, timing information relative to  
5 the clock maintained by the task source device and identifications of the member devices of  
6 the synchrony group, and  
7 B. a migration control module configured to enable the computer to, after the migration  
8 information has been received.,  
9 i. distribute the series of tasks to the synchrony group, each task being associated with  
10 a time stamp indicating a time, relative to the timing information that it receives from  
11 the device operating as the task source device, at which the devices comprising the  
12 synchrony group are to execute the respective task, and  
13 ii. notify the members of the synchrony group that it is to thereafter operate as the task  
14 source device.

1 240. A computer program product as defined in claim 239 in which the information respecting the  
2 tasks that are to be distributed is a source of streaming information, the migration control module  
3 being configured to enable the computer to, after the migration information has been received,  
4 assemble the streaming information into tasks and associate each task with a said time stamp.

1 241. A computer program product as defined in claim 239 in which the information respecting the  
2 tasks that are to be distributed is in a file identified in the migration information, the migration  
3 control module being configured to enable the computer to obtain information from the identified  
4 file, assemble the information into tasks and associate each task with a said time stamp.

1 242. A computer program product as defined in claim 241 in which the information respecting the  
2 tasks that are to be distributed begins at an offset, identified in the migration information, into the  
3 identified file, the migration control module being configured to enable the computer to assemble  
4 the information from a position in the file associated with the identified offset.

1 243. A computer program product as defined in claim 241 in which the information respecting the  
2 tasks that are to be distributed is in a series of files identified in the migration information, the  
3 migration control module being configured to enable the computer to obtain information from  
4 successive files in the series assemble the information into tasks and associate each task with as said  
5 time stamp.

1 244. A computer program product as defined in claim 218 further including a clock rate adjustment  
2 module configured to enable the computer to adjust the member device's clock rate in relation to a  
3 clock rate value maintained by the task source device's clock.

1 245. A computer program product as defined in claim 244 in which the clock rate adjustment module  
2 is configured to enable the computer to adjust the clock rate in relation to time stamps associated  
3 with respective ones of the tasks received from the task source device.

1 246. A computer program product for use in connection with a computer to provide a task source  
2 device for distributing a series of tasks for execution by at least one other device at respective  
3 execution times, the computer program product comprising a computer readable medium having  
4 encoded thereon:

- 5 A. a task acquisition module configured to enable the computer to obtain respective ones of the  
6 tasks;
- 7 B. a task execution time determination module configured to enable the computer to determine  
8 a time at which each respective task is to be executed, and to associate the respective task  
9 with a time stamp indicating its execution time;
- 10 C. a task transmission module configured to enable the computer to transmit the series of tasks  
11 to said at least one other device; and
- 12 D. an execution control command generation module configured to enable the computer to , in  
13 response to a predetermined event, enable the task transmission module to insert into the  
14 series of tasks transmitted by the task transmission module a command to enable the at least  
15 one other device to modify the execution sequence of the tasks transmitted thereto.

1 247. A computer program product as defined in claim 246 which the task transmission module is  
2 configured to enable the computer to utilize a selected multi-cast transmission methodology.

1 248. A computer program product as defined in claim 246 in which the predetermined event  
2 comprises input indicia provided by an operator.

1 249. A computer program product as defined in claim 246 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the task transmission module to insert into the series of tasks transmitted by the  
4 task transmission module a command to enable the at least one other device to control execution of  
5 at least one task in relation to the time the predetermined event occurs.

1 250. A computer program product as defined in claim 249 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the task transmission module to insert into the series of tasks transmitted by the  
4 task transmission module a command to enable the at least one other device to terminate execution



5 of a task that it is currently executing and/or to not execute at least one task that is to be executed  
6 subsequent to the predetermined event.

1 251. A computer program product as defined in claim 249 in which the series of tasks includes a  
2 series of task sequences with each task sequence including a sub-set of the series of tasks, the  
3 execution control command generation module being configured to enable the computer to , in  
4 response to said predetermined event,

5 (i) enable the task transmission module to insert into the series of tasks transmitted by the task  
6 transmission module, a command enabling the at least one other device to terminate  
7 execution of the currently executing task and/or to not execute at least one subsequent task,  
8 if any, in the task sequence including the currently executing task; and

9 (ii) enable

10 (a) the task execution time determination module to provide that time stamps associated  
11 with tasks of task sequences subsequent to the task sequence currently being  
12 executed will reflect the termination and/or non-execution of tasks from the task  
13 sequence of the task that is currently being executed, and

14 (b) the task transmission module to transmit the tasks of the subsequent task sequences  
15 to the at least one other device.

1 252. A computer program product as defined in claim 251 in which the task transmission module  
2 is configured to enable the computer to insert a command to enable the at least one other device to  
3 not execute all tasks in the task sequence subsequent to the terminated and/or non-executed task.

1 253. A computer program product as defined in claim 246 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the task transmission module to insert into the series of tasks transmitted by the  
4 task transmission module a command to enable the at least one other device to control execution of  
5 a task in relation to the task's position in the series of tasks.

1 254. A computer program product as defined in claim 253 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the task transmission module to insert into the series of tasks transmitted by the  
4 task transmission module a command to enable the at least one other device to cancel execution of  
5 a task in relation to the task's position in the series of tasks.

1 255. A computer program product as defined in claim 254 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the task transmission module to insert into the series of tasks transmitted by the  
4 task transmission module a command to enable the at least one other device to cancel execution of  
5 a previously-transmitted task in relation to the task's position in the series of tasks.

1 256. A computer program product as defined in claim 255 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the task transmission module to insert into the series of tasks transmitted by the  
4 task transmission module a command to enable the at least one other device to cancel execution of  
5 a previously-transmitted task, in relation to the task's position in the series of tasks, for which  
6 execution has not begun.

1 257. A computer program product as defined in claim 253 in which the series of tasks includes a  
2 series of task sequences with each task sequence including a sub-set of the series of tasks, the  
3 execution control command generation module being configured to enable the computer to , in  
4 response to said predetermined event,

- 5 (i) enable the task transmission module to insert into the series of tasks transmitted by the task  
6 transmission module, a command enabling the at least one other device to cancel execution  
7 of a task sequence for which execution has not begun; and  
8 (ii) enable

- 9           (a)     the task execution time determination module to provide that time stamps associated  
10                 with tasks of task sequences subsequent to the task sequence whose execution was  
11                 cancelled will reflect the cancellation, and  
12           (b)     the task transmission module to transmit the tasks of the subsequent task sequences  
13                 to the at least one other device.

1     258. A computer program product for use in connection with a computer to provide a task source  
2     device for distributing a series of tasks for execution by at least one other device at respective  
3     execution times, the computer program product comprising a computer readable medium having  
4     encoded thereon:

- 5     A.     a task acquisition module configured to enable the computer to obtain respective ones of the  
6             tasks;  
7     B.     a task execution time determination module configured to enable the computer to determine  
8             a time at which each respective task is to be executed, and to associate the respective task  
9             with a time stamp indicating its execution time, the task execution time determination  
10            module being configured to enable the computer to provide, associated with at least one task,  
11            a time stamp indicating a task execution time later than the time currently indicated by a  
12            clock maintained by the task source device; and  
13     C.     a task transmission module configured to enable the computer to transmit the series of tasks  
14             to said at least one other device.

1     259. A computer program product as defined in claim 258 in which the task execution time  
2     determination module is configured to enable the computer to select the delay interval between the  
3     time indicated by the time stamp and the current time so to be sufficient to provide that the at least  
4     one task distributed by the task source device can be executed by the member devices at the time  
5     indicated by the time stamp.

1     260. A computer program product as defined in claim 259 in which the task execution time  
2     determination module is configured to enable the computer to select the delay interval between the

3 time indicated by the time stamp and the current time so to be sufficient to provide that the at least  
4 one task distributed by the task source device can be distributed to the member devices for execution  
5 at the time indicated by the time stamp.

1 261. A computer program product as defined in claim 258 in which task acquisition module is  
2 configured to enable the computer to obtain information associated with the tasks from at least two  
3 types of information sources, the task execution time determination module being configured to  
4 enable the computer to select, for each task the delay interval between the time indicated by the time  
5 stamp and the current time based on the information source type that is associated with the respective  
6 task.

1 262. A computer program product for use in connection with a computer to provide a task source  
2 device for distributing a series of tasks for execution by at least one other device, the computer  
3 program product comprising a computer readable medium having encoded thereon:

- 4 A. a task acquisition module configured to enable the computer to obtain respective ones of the  
5 tasks;
- 6 B. a task execution time determination module configured to enable the computer to determine  
7 a time at which each respective task is to be executed, and to associate the respective task  
8 with a time stamp indicating its execution time;
- 9 C. a task transmission module configured to enable the computer to transmit the series of tasks  
10 to said at least one other device; and
- 11 D. a task source device migration control module configured to enable the computer to, in  
12 response to a predetermined event, provide migration information to another device, the  
13 migration information including a source for information respecting the tasks to be  
14 distributed, timing information relative to the clock maintained by the task source device  
15 and identifications of the member devices of the synchrony group.

1 263. A system comprising a plurality of devices,

- 2 A one device being enabled to operate as a task source device, the task source device being  
3 enabled to transmit a series of tasks to the other devices, each task being associated with  
4 execution time information;
- 5 B. at least one device being enabled to operate as a task execution device, the task execution  
6 device being enabled to receive the series of tasks from the network and executing each  
7 respective task at a time in relation to the timing information associated with the respective  
8 task; and
- 9 C. one device being enabled to operate as a control device, the control device being enabled to  
10 control operations of the task source device and the task execution device.

1 264. A system as defined in claim 263 in which the device that is enabled to operate as the control  
2 device is also enabled to operate as a task execution device.

1 265. A system as defined in claim 263 in which the device that is enabled to operate as the control  
2 device is also enabled to operate as the task source device.

1 266. A system as defined in claim 263 in which the device that is enabled to operate as the task  
2 source device is also enabled to operate as a task execution device.

1 267. A system for facilitating processing of data by device operating as a member of a synchrony  
2 group, synchronously with a clock maintained by a data source device that provides the data to the  
3 synchrony group,

- 4 A. the data source device being configured to divide the data into a series of frames for  
5 distribution to the synchrony group, each frame being associated with a time stamp  
6 indicating a time, relative to a clock maintained by the data source device, at which the  
7 devices comprising the synchrony group are to process the frame;
- 8 B each member device in the synchrony group being configured to:
- 9 (i) periodically obtain from the data source device an indication of a current time value  
10 indicated by the data source device's clock;

- 11           (ii)     receive the series of frames from the data source device;
- 12           (iii)    determine, from the time stamp associated with each respective frame and a time
- 13                   differential value representing a difference between the current time value indicated
- 14                   by the data source device's clock, a current time value indicated by the member
- 15                   device's respective clock, a time, relative to the member device's respective clock, at
- 16                   which the member device is to process the frame; and
- 17           (iv)     process the respective frame at the determined time.

1     268. A system as defined in claim 267 in which at least one frame comprises audio data, each

2     member device, while processing each frame, producing sound represented by the respective frame.

1     269. A system as defined in claim 267 comprising a plurality of member devices, the member

2     devices processing each frame synchronously in relation to the clock maintained by the data source

3     device so that they all produce sound represented by the respective frame synchronously.

1     270. A system as defined in claim 269 in which the data source device is configured to provide time

2     stamps for at least two successive frames so that the member devices will play them with a selected

3     time interval therebetween.

1     271. A system as defined in claim 270 in which the time interval is zero.

1     272. A system as defined in claim 269 in which one of the member devices operates as a master

2     device for the synchrony group, any other member devices comprising respective slave devices, the

3     master device being configured to perform at least one type of synchrony group management

4     operation in connection with the member devices comprising the synchrony group.

1     273. A system as defined in claim 272 in which the master device is further configured to provide

2     status information relating to the status of the synchrony group to the user interface module.

1 274. A system as defined in claim 273 in which the status information includes identifications of the  
2 devices comprising the synchrony group.

1 275. A system as defined in claim 273 in which each frame is associated with a frame sequence, each  
2 frame sequence comprising at least one frame, the frame or frames comprising each frame sequence  
3 being associated with an audio track, each audio track being associated with an identifier, the status  
4 information including the identification of the audio track currently being played.

1 276. A system as defined in claim 272, the system comprising at least one additional device, in  
2 which, in one type of synchrony group management operation, the master device is configured to  
3 enable the at least one additional device to join the synchrony group as a slave device.

1 277. A system as defined in claim 276 in which the data source device is configured to distribute  
2 frames to the member devices using a selected multi-cast transmission methodology, the member  
3 devices being configured to buffer the frames until they are to be played, and further in which, when  
4 the at least one additional device joins the synchrony group as a slave device, the data source device  
5 is enabled to transmit at least one previously distributed frame to the slave device using a selected  
6 unicast transmission methodology.

1 278. A system as defined in claim 272 in which, in at least one type of synchrony group management  
2 operation, the master device is configured to enable the data source device to join the synchrony  
3 group as a slave device, the data source device continuing to operate as the data source device for  
4 the synchrony group.

1 279. A system as defined in claim 272 in which, in at least one type of synchrony group management  
2 operation, the master device is configured to enable a slave device to disengage from the synchrony  
3 group, the disengaged slave device thereafter not being a member device in the synchrony group and  
4 not playing frames distributed by the data source device.

1 280. A system as defined in claim 272 in which, in at least one type of synchrony group management  
2 operation, the master device is configured to control the series of frames to be distributed by the data  
3 source device.

1 281. A system as defined in claim 280 in which each frame is associated with a frame sequence, each  
2 frame sequence comprising at least one frame, the frame or frames comprising each frame sequence  
3 being associated with an audio track, the master device being configured to control the frames to be  
4 distributed by the data source device on a track-by-track basis.

1 282. A system as defined in claim 281 in which, in at least one type of synchrony group management  
2 operation, the master device is further configured to control playback by the member devices of the  
3 frames associated with the respective audio tracks that have been distributed by the data source  
4 device in response to control information from the user interface module.

1 283. A system as defined in claim 282 in which, in response to control information from the user  
2 interface module to facilitate control of playback by the member devices, the master device is  
3 configured to enable the data source device to distribute a playback control command to the member  
4 devices.

1 284. A system as defined in claim 283 in which a playback control command enables the member  
2 devices to terminate playback of a track that is currently being played back.

1 285. A system as defined in claim 284 in which the playback control command enables the member  
2 devices to terminate playback of a track with a frame subsequent to a frame currently being played.

1 286. A system as defined in claim 283 in which the playback control command enables the member  
2 devices to cancel playback of a track at least one of whose frames has been previously distributed,  
3 but for which playback has not begun.



1 287. A system as defined in claim 272 in which, in at least one type of synchrony group management  
2 operation, the member device operating as the master device is configured to enable the master  
3 device to migrate from itself to another member device in the synchrony group.

1 288. A system as defined in claim 272 in which, in at least one type of synchrony group management  
2 operation, the master device is configured to enable the data source device to migrate from one  
3 device to another device in the system.

1 289. A system as defined in claim 288 in which

- 2 A. the device operating as the data source device is configured to, after being enabled to migrate  
3 the data source device to said other device, provide migration information to the other  
4 device, the migration information including a source for information respecting the frames  
5 to be distributed, timing information relative to the clock maintained by the data source  
6 device and identifications of the member devices,
- 7 B. the other device being configured to, after receiving the migration information,
- 8 i. distribute the series of frames to the synchrony group, each frame being associated  
9 with a time stamp indicating a time, relative to the timing information that it receives  
10 from the device operating as the data source device, at which the devices comprising  
11 the synchrony group are to execute the respective frame, and
- 12 ii. notify the members of the synchrony group that it is to thereafter operate as the data  
13 source device.

1 290. A system as defined in claim 289 in which the information respecting the frames that are to be  
2 distributed is a source of streaming information, the other device being configured to, after receiving  
3 the migration information, assemble the streaming information into frames and associate each frame  
4 with a said time stamp.

1 291. A system as defined in claim 289 in which the information respecting the frames that are to be  
2 distributed is in a file identified in the migration information, the other device being configured to

3 obtain information from the identified file, assemble the information into frames and associate each  
4 frame with a said time stamp.

1 292. A system as defined in claim 291 in which the information respecting the frames that are to be  
2 distributed begins at an offset, identified in the migration information, into the identified file, the  
3 other device being configured to assemble the information from a position in the file associated with  
4 the identified offset.

1 293. A system as defined in claim 291 in which the information respecting the frames that are to be  
2 distributed is in a series of files identified in the migration information, the other device being  
3 configured to obtain information from successive files in the series assemble the information into  
4 frames and associate each frame with as said time stamp.

1 294. A system as defined in claim 267 in which the data source device is further configured to  
2 distribute the frames using a selected multi-cast message transmission methodology.

1 295. A system as defined in claim 267 in which the data source device is configured to provide,  
2 associated with at least one frame, a time stamp indicating a frame execution time later than the time  
3 currently indicated by the clock maintained by the data source device.

1 296. A system as defined in claim 295 in which the data source device is configured to select the  
2 delay interval between the time indicated by the time stamp and the current time so to be sufficient  
3 to provide that the at least one frame distributed by the data source device can be executed by the  
4 member devices at the time indicated by the time stamp.

1 297. A system as defined in claim 296 in which the data source device is configured to select the  
2 delay interval between the time indicated by the time stamp and the current time so to be sufficient  
3 to provide that the at least one frame distributed by the data source device can be distributed to the  
4 member devices for execution at the time indicated by the time stamp

1 298. A system as defined in claim 295 in which data source device is configured to obtain  
2 information associated with the frames from at least two types of information sources, the data  
3 source device being further configured to select, for each frame the delay interval between the time  
4 indicated by the time stamp and the current time based on the information source type that is  
5 associated with the respective frame.

1 299. A system as defined in claim 267 in which at least one member device is further configured to  
2 adjust its clock rate in relation to a clock rate value maintained by the data source device's clock.

1 300. A system as defined in claim 299 in which the at least one member device is configured to  
2 adjust its clock rate in relation to time stamps associated with respective ones of the frames received  
3 from the data source device.

1 301. A system as defined in claim 267 in which at least one other device operates as a data source  
2 device configured to distribute frames to a second synchrony group, the device operating as the data  
3 source device for the first synchrony group also operating as a member device of a second synchrony  
4 group.

1 302. A system as defined in claim 267 in which at least one member device comprises:

- 2 A. an interface module configured to receive the series of frames, each frame being associated  
3 with a time stamp, each time stamp indicating a time value relative to a time indicated a  
4 clock maintained by the data source, at which the device is to process the respective frame;
- 5 B. a current time retrieval module configured to obtain, from the data source, a current time  
6 value as indicated by the data source's clock;
- 7 C. an processing time determination module configured to determine, from the time stamp  
8 associated with each respective frame and a time differential value representing a difference  
9 between the current time value obtained by the current time retrieval module and a current

time value indicated by a clock maintained by the device, a time, relative to the device's respective clock, at which the frame is to be processed; and

- D. a frame processing module configured to process each respective frame at the time determined by the processing time determination module.

303. A system as defined in claim 302 in which the at least one frame comprises audio data, each member device, while processing each frame, producing a signal representing sound represented by the respective frame.

304. A system as defined in claim 302 further including a control module for controlling execution of commands received by said interface module.

305. A device as defined in claim 304 further comprising a buffer configured to buffer frames that the interface module has received until they are to be processed, the frame processing module being configured to process the buffered frames at the times determined by the processing time determination module.

306. A system as defined in claim 305 in which the each frame is associated with a track, each track including at least one frame, the interface module being further configured to receive playback control commands for controlling processing of tracks, the control module being configured to execute at least one playback control command controlling track processing.

307. A system as defined in claim 306 in which at least one type of playback control command enables the control module to, in turn, enable the frame processing module to terminate playback of a track that is currently being played back.

308. A system as defined in claim 307 in which the playback control command enables the control module to terminate playback of a track with a frame subsequent to a frame currently being played.

1 309. A system as defined in claim 306 in which the playback control command enables the control  
2 module to cancel playback of a track at least one of whose frames has been previously distributed,  
3 but for which playback has not begun.

1 310. A system as defined in claim 306 in which the control module is configured to enable the frame  
2 processing module to resume processing of at least one frame associated with a subsequent track at  
3 a time determined by the processing time determination module.

1 311. A system as defined in claim 302 in which the member device includes:

- 2 A. a migration information receiving module configured to receive migration information from  
3 the task source device, the migration information including a source for information  
4 respecting the tasks to be distributed, timing information relative to the clock maintained by  
5 the task source device and identifications of the member devices of the synchrony group, and  
6 B. a migration control module configured to, after the migration information has been received.,  
7 i. distribute the series of tasks to the synchrony group, each task being associated with  
8 a time stamp indicating a time, relative to the timing information that it receives from  
9 the device operating as the task source device, at which the devices comprising the  
10 synchrony group are to execute the respective task, and  
11 ii. notify the members of the synchrony group that it is to thereafter operate as the task  
12 source device.

1 312. A system as defined in claim 311 in which the information respecting the frames that are to be  
2 distributed is a source of streaming information, the migration control module being configured to,  
3 after the migration information has been received, assembling the streaming information into frames  
4 and associate each frame with a said time stamp.

1 313. A system as defined in claim 311 in which the information respecting the frames that are to be  
2 distributed is in a file identified in the migration information, the migration control module being

3 configured to obtain information from the identified file, assemble the information into frames and  
4 associate each frame with a said time stamp.

1 314. A system as defined in claim 313 in which the information respecting the frames that are to be  
2 distributed begins at an offset, identified in the migration information, into the identified file, the  
3 migration control module being configured to assemble the information from a position in the file  
4 associated with the identified offset.

1 315. A system as defined in claim 313 in which the information respecting the frames that are to be  
2 distributed is in a series of files identified in the migration information, the migration control module  
3 being configured to obtain information from successive files in the series assemble the information  
4 into frames and associate each frame with as said time stamp.

1 316. A system as defined in claim 302 in which the member device further includes a clock rate  
2 adjustment module configured to adjust the member device's clock rate in relation to a clock rate  
3 value maintained by the data source device's clock.

1 317. A system as defined in claim 316 in which the clock rate adjustment module is configured to  
2 adjust the clock rate in relation to time stamps associated with respective ones of the frames received  
3 from the data source device.

1 318. A system as defined in claim 267 in which the data source device comprises:

- 2 A. a frame acquisition module configured to obtain respective ones of the frames;
- 3 B. a frame execution time determination module configured to determine a time at which each  
4 respective frame is to be executed, and to associate the respective frame with a time stamp  
5 indicating its execution time;
- 6 C. a frame transmission module configured to transmit the series of frames to said at least one  
7 other device; and

8 D. an execution control command generation module configured to, in response to a  
9 predetermined event, enable the frame transmission module to insert into the series of frames  
10 transmitted by the frame transmission module a command to enable the at least one other  
11 device to modify the execution sequence of the frames transmitted thereto.

1 319. A system as defined in claim 318 in which at least one frame comprises audio data, each  
2 member device, while processing each frame, producing generating a signal representing sound  
3 represented by the respective frame.

1 320. A system as defined in claim 318 in which the frame transmission module is configured to  
2 utilize a selected multi-cast transmission methodology.

1 321. A system as defined in claim 318 in which the predetermined event comprises input indicia  
2 provided by an operator.

1 322. A system as defined in claim 321 in which, in response to said predetermined event, the  
2 execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to control execution of at least one frame in relation to the time  
5 the predetermined event occurs.

1 323. A system as defined in claim 322 in which, in response to said predetermined event, the  
2 execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to terminate execution of a frame that it is currently executing  
5 and/or to not execute at least one frame that is to be executed subsequent to the predetermined event.

1 324. A data source device as defined in claim 323 in which the series of frames includes a series of  
2 frame sequences with each frame sequence including a sub-set of the series of frames, the execution  
3 control command generation module being configured to, in response to said predetermined event,

4 (i) enable the frame transmission module to insert into the series of frames transmitted by the  
5 frame transmission module, a command enabling the at least one other device to terminate  
6 execution of the currently executing frame and/or to not execute at least one subsequent  
7 frame, if any, in the frame sequence including the currently executing frame; and

8 (ii) enable

9 (a) the frame execution time determination module to provide that time stamps  
10 associated with frames of frame sequences subsequent to the frame sequence  
11 currently being executed will reflect the termination and/or non-execution of frames  
12 from the frame sequence of the frame that is currently being executed, and

13 (b) the frame transmission module to transmit the frames of the subsequent frame  
14 sequences to the at least one other device.

1 325. A system as defined in claim 324 in which the frame transmission module is configured to  
2 insert a command to enable the at least one other device to not execute all frames in the frame  
3 sequence subsequent to the terminated and/or non-executed frame.

1 326. A system as defined in claim 267 in which, in response to said predetermined event, the  
2 execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to control execution of a frame in relation to the frame's  
5 position in the series of frames.

1 327. A system as defined in claim 326 in which, in response to said predetermined event, the  
2 execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command



4 to enable the at least one other device to cancel execution of a frame in relation to the frame's  
5 position in the series of frames.

1 328. A system as defined in claim 326 in which, in response to said predetermined event, the  
2 execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to cancel execution of a previously-transmitted frame in  
5 relation to the frame's position in the series of frames.

1 329. A system as defined in claim 328 in which, in response to said predetermined event, the  
2 execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to cancel execution of a previously-transmitted frame, in  
5 relation to the frame's position in the series of frames, for which execution has not begun.

1 330. A system as defined in claim 327 in which the series of frames includes a series of frame  
2 sequences with each frame sequence including a sub-set of the series of frames, the execution control  
3 command generation module being configured to, in response to said predetermined event,

4 (i) enable the frame transmission module to insert into the series of frames transmitted by the  
5 frame transmission module, a command enabling the at least one other device to cancel  
6 execution of a frame sequence for which execution has not begun; and

7 (ii) enable

8 (a) the frame execution time determination module to provide that time stamps  
9 associated with frames of frame sequences subsequent to the frame sequence whose  
10 execution was cancelled will reflect the cancellation, and

11 (b) the frame transmission module to transmit the frames of the subsequent frame  
12 sequences to the at least one other device.

1 331. A system as defined in claim 267 in which the data source device comprises:

- 2 A. a frame acquisition module configured to obtain respective ones of the frames;
- 3 B. a frame execution time determination module configured to determine a time at which each  
4 respective frame is to be executed, and to associate the respective frame with a time stamp  
5 indicating its execution time;
- 6 C. a frame transmission module configured to transmit the series of frames to said at least one  
7 other device; and
- 8 D. a data source device migration control module configured to, in response to a predetermined  
9 event, provide migration information to another device, the migration information including  
10 a source for information respecting the frames to be distributed, timing information relative  
11 to the clock maintained by the data source device and identifications of the member devices  
12 of the synchrony group.

1 332. A system as defined in claim 331 in which the data source device is configured to provide,  
2 associated with at least one frame, a time stamp indicating a frame execution time later than the time  
3 currently indicated by the clock maintained by the data source device.

1 333. A system as defined in claim 332 in which the data source device is configured to select the  
2 delay interval between the time indicated by the time stamp and the current time so to be sufficient  
3 to provide that the at least one frame distributed by the data source device can be executed by the  
4 member devices at the time indicated by the time stamp.

1 334. A system as defined in claim 333 in which the data source device is configured to select the  
2 delay interval between the time indicated by the time stamp and the current time so to be sufficient  
3 to provide that the at least one frame distributed by the data source device can be distributed to the  
4 member devices for execution at the time indicated by the time stamp

1 335. A system as defined in claim 333 in which data source device is configured to obtain  
2 information associated with the frames from at least two types of information sources, the data  
3 source device being further configured to select, for each frame the delay interval between the time

4 indicated by the time stamp and the current time based on the information source type that is  
5 associated with the respective frame.

1 336. A device for processing a series of frames of data provided by a data source at times specified  
2 by the data source in relation to a clock maintained by the data source, the device comprising

- 3 A. an interface module configured to receive the series of frames, each frame being associated  
4 with a time stamp, each time stamp indicating a time value relative to a time indicated a  
5 clock maintained by the data source, at which the device is to process the respective frame;
- 6 B. a current time retrieval module configured to obtain, from the data source, a current time  
7 value as indicated by the data source's clock;
- 8 C. an processing time determination module configured to determine, from the time stamp  
9 associated with each respective frame and a time differential value representing a difference  
10 between the current time value obtained by the current time retrieval module and a current  
11 time value indicated by a clock maintained by the device, a time, relative to the device's  
12 respective clock, at which the frame is to be processed; and
- 13 D. a frame processing module configured to process each respective frame at the time  
14 determined by the processing time determination module.

1 337. A device as defined in claim 336 in which the frame comprises audio data, each member device,  
2 while processing each frame, producing a signal representing sound represented by the respective  
3 frame.

1 338. A device as defined in claim 336 further including a control module for controlling execution  
2 of commands received by said interface module.

1 339. A device as defined in claim 336 further comprising a buffer configured to buffer frames that  
2 the interface module has received until they are to be processed, the frame processing module being  
3 configured to process the buffered frames at the times determined by the processing time  
4 determination module.

1 340. A device as defined in claim 339 in which the each frame is associated with a track, each track  
2 including at least one frame, the interface module being further configured to receive playback  
3 control commands for controlling processing of tracks, the control module being configured to  
4 execute at least one playback control command controlling track processing.

1 341. A device as defined in claim 340 in which at least one type of playback control command  
2 enables the control module to, in turn, enable the frame processing module to terminate playback  
3 of a track that is currently being played back.

1 342. A device as defined in claim 341 in which the playback control command enables the control  
2 module to terminate playback of a track with a frame subsequent to a frame currently being played.

1 343. A device as defined in claim 340 in which the playback control command enables the control  
2 module to cancel playback of a track at least one of whose frames has been previously distributed,  
3 but for which playback has not begun.

1 344. A device as defined in claim 340 in which the control module is configured to enable the frame  
2 processing module to resume processing of at least one frame associated with a subsequent track at  
3 a time determined by the processing time determination module.

1 345. A device as defined in claim 338, the control module being configured to, in response to receipt  
2 of a command to become a member of a synchrony group, enable the interface module to receive  
3 frames for processing by the frame processing module.

1 346. A device as defined in claim 345 in which the control module is configured to, in response to  
2 receipt of a command to become a member of a synchrony group, enable the interface module to  
3 receive frames currently being transmitted using a selected multi-cast transmission methodology,

4 and further to retrieve at least one previously distributed frame using a selected unicast transmission  
5 methodology.

1 347. A device as defined in claim 346 in which the control module is configured to, in receipt of a  
2 command to disengage from a synchrony group, disable the interface module from receiving frames  
3 and the frame processing module from processing previously received frames that have not yet been  
4 processed.

1 348. A device as defined in claim 336 further comprising a user interface module interface module  
2 configured to receive control information from a user interface module, the control module being  
3 configured to enable selected operations to be performed in response to the control information.

1 349. A device as defined in claim 348 in which, in response to control information to enable another  
2 device to become a member of the device's synchrony group, the control module enables the  
3 interface module to transmit a command to the other device to enable the other device to become a  
4 member of the synchrony group.

1 350. A device as defined in claim 349 in which, in response to control information to enable another  
2 device that is a member of the device's synchrony group to disengage from the synchrony group, the  
3 control module enables the interface module to transmit a command to the other device to enable the  
4 other device to disengage from the synchrony group.

1 351. A device as defined in claim 348 in which, in response to control information to enable the data  
2 source to begin operating, the control module performs selected operations to enable the data source  
3 to begin operating.

1 352. A device as defined in claim 351, the device also operating as the data source, the device  
2 including a frame generator module configured to, under control of the control module, obtain  
3 information from which the frames are to be generated and generate the frames.

1 353. A device as defined in claim 342 in which the interface module is further configured to transmit  
2 the frames to at least one other device.

1 354. A device as defined in claim 343 in which the device is not the data source, the control module  
2 being configured to enable the interface module to transmit a command to enable the data source to  
3 operate.

1 355. A device as defined in claim 354 in which each frame is associated with a track, each track  
2 including at least one frame, and, in response to receipt of control information enabling processing  
3 of a track currently being processed to be terminated, the control module is configured to enable the  
4 interface module to transmit a command to enable the data source to insert a resynchronize command  
5 in the series of frames associated with the track to enable termination of processing of the track.

1 356. A device as defined in claim 354 in which each frame is associated with a track, each track  
2 including at least one frame, and, in response to receipt of control information enabling processing  
3 of a track at least a portion of which has been received, but for which processing has not begun, the  
4 control module is configured to enable the interface module to transmit a command to enable the  
5 data source to insert a resynchronize command in the series of commands to disable processing of  
6 the track.

1 357. A device as defined in claim 344 in which the control module is configured to enable the user  
2 interface module interface module to transmit status information to the user interface module.

1 358. A device as defined in claim 357 in which the status information includes the processing status  
2 of at least one frame.

1 359. A device as defined in claim 336 further including:

- 2 A. a migration information receiving module configured to receive migration information from  
3 the data source device, the migration information including a source for information  
4 respecting the frames to be distributed, timing information relative to the clock maintained  
5 by the data source device and identifications of the member devices of the synchrony group,  
6 and  
7 B. a migration control module configured to, after the migration information has been received.,  
8 i. distribute the series of frames to the synchrony group, each frame being associated  
9 with a time stamp indicating a time, relative to the timing information that it receives  
10 from the device operating as the data source device, at which the devices comprising  
11 the synchrony group are to execute the respective frame, and  
12 ii. notify the members of the synchrony group that it is to thereafter operate as the data  
13 source device.

1 360. A device as defined in claim 359 in which the information respecting the frames that are to be  
2 distributed is a source of streaming information, the migration control module being configured to,  
3 after the migration information has been received, assembling the streaming information into frames  
4 and associate each frame with a said time stamp.

1 361. A device as defined in claim 359 in which the information respecting the frames that are to be  
2 distributed is in a file identified in the migration information, the migration control module being  
3 configured to obtain information from the identified file, assemble the information into frames and  
4 associate each frame with a said time stamp.

1 362. A device as defined in claim 361 in which the information respecting the frames that are to be  
2 distributed begins at an offset, identified in the migration information, into the identified file, the  
3 migration control module being configured to assemble the information from a position in the file  
4 associated with the identified offset.

1 363. A device as defined in claim 361 in which the information respecting the frames that are to be  
2 distributed is in a series of files identified in the migration information, the migration control module  
3 being configured to obtain information from successive files in the series assemble the information  
4 into frames and associate each frame with as said time stamp.

1 364. A device as defined in claim 336 further including a clock rate adjustment module configured  
2 to adjust the member device's clock rate in relation to a clock rate value maintained by the data  
3 source device's clock.

1 365. A data source device for distributing a series of frames for execution by at least one other  
2 device at respective execution times, the data source device comprising:

- 3 A. a frame acquisition module configured to obtain respective ones of the frames;
- 4 B. a frame execution time determination module configured to determine a time at which each  
5 respective frame is to be executed, and to associate the respective frame with a time stamp  
6 indicating its execution time;
- 7 C. a frame transmission module configured to transmit the series of frames to said at least one  
8 other device; and
- 9 D. an execution control command generation module configured to, in response to a  
10 predetermined event, enable the frame transmission module to insert into the series of frames  
11 transmitted by the frame transmission module a command to enable the at least one other  
12 device to modify the execution sequence of the frames transmitted thereto.

1 366. A data source device as defined in claim 365 in which the frame transmission module is  
2 configured to utilize a selected multi-cast transmission methodology.

1 367. A data source device as defined in claim 365 in which the predetermined event comprises input  
2 indicia provided by an operator.



1 368. A data source device as defined in claim 367 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to control execution of at least one frame in relation to the time  
5 the predetermined event occurs.

1 369. A data source device as defined in claim 368 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to terminate execution of a frame that it is currently executing  
5 and/or to not execute at least one frame that is to be executed subsequent to the predetermined event.

1 370. A data source device as defined in claim 368 in which the series of frames includes a series of  
2 frame sequences with each frame sequence including a sub-set of the series of frames, the execution  
3 control command generation module being configured to, in response to said predetermined event,  
4 (i) enable the frame transmission module to insert into the series of frames transmitted by the  
5 frame transmission module, a command enabling the at least one other device to terminate  
6 execution of the currently executing frame and/or to not execute at least one subsequent  
7 frame, if any, in the frame sequence including the currently executing frame; and  
8 (ii) enable  
9 (a) the frame execution time determination module to provide that time stamps  
10 associated with frames of frame sequences subsequent to the frame sequence  
11 currently being executed will reflect the termination and/or non-execution of frames  
12 from the frame sequence of the frame that is currently being executed, and  
13 (b) the frame transmission module to transmit the frames of the subsequent frame  
14 sequences to the at least one other device.

1 371. A data source device as defined in claim 370 in which the frame transmission module is  
2 configured to insert a command to enable the at least one other device to not execute all frames in  
3 the frame sequence subsequent to the terminated and/or non-executed frame.

1 372. A data source device as defined in claim 362 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to control execution of a frame in relation to the frame's  
5 position in the series of frames.

1 373. A data source device as defined in claim 372 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to cancel execution of a frame in relation to the frame's  
5 position in the series of frames.

1 374. A data source device as defined in claim 371 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to cancel execution of a previously-transmitted frame in  
5 relation to the frame's position in the series of frames.

1 375. A data source device as defined in claim 374 in which, in response to said predetermined event,  
2 the execution control command generation module is configured to enable the frame transmission  
3 module to insert into the series of frames transmitted by the frame transmission module a command  
4 to enable the at least one other device to cancel execution of a previously-transmitted frame, in  
5 relation to the frame's position in the series of frames, for which execution has not begun.

1 376. A data source device as defined in claim 371 in which the series of frames includes a series of  
2 frame sequences with each frame sequence including a sub-set of the series of frames, the execution  
3 control command generation module being configured to, in response to said predetermined event,

4 (i) enable the frame transmission module to insert into the series of frames transmitted by the  
5 frame transmission module, a command enabling the at least one other device to cancel  
6 execution of a frame sequence for which execution has not begun; and

7 (ii) enable

8 (a) the frame execution time determination module to provide that time stamps  
9 associated with frames of frame sequences subsequent to the frame sequence whose  
10 execution was cancelled will reflect the cancellation, and

11 (b) the frame transmission module to transmit the frames of the subsequent frame  
12 sequences to the at least one other device.

1 377. A data source device for distributing a series of frames for execution by at least one other  
2 device at respective execution times, the data source device comprising:

3 A. a frame acquisition module configured to obtain respective ones of the frames;

4 B. a frame execution time determination module configured to determine a time at which each  
5 respective frame is to be executed, and to associate the respective frame with a time stamp  
6 indicating its execution time, the frame execution time determination module being  
7 configured to provide, associated with at least one frame, a time stamp indicating a frame  
8 execution time later than the time currently indicated by a clock maintained by the data  
9 source device; and

10 C. a frame transmission module configured to transmit the series of frames to said at least one  
11 other device.

1 377. A system as defined in claim 377 in which the data source device is configured to select the  
2 delay interval between the time indicated by the time stamp and the current time so to be sufficient  
3 to provide that the at least one frame distributed by the data source device can be executed by the  
4 member devices at the time indicated by the time stamp.

1 379. A system as defined in claim 378 in which the data source device is configured to select the  
2 delay interval between the time indicated by the time stamp and the current time so to be sufficient  
3 to provide that the at least one frame distributed by the data source device can be distributed to the  
4 member devices for execution at the time indicated by the time stamp

1 380. A system as defined in claim 377 in which data source device is configured to obtain  
2 information associated with the frames from at least two types of information sources, the data  
3 source device being further configured to select, for each frame the delay interval between the time  
4 indicated by the time stamp and the current time based on the information source type that is  
5 associated with the respective frame.

1 381. A data source device for distributing a series of frames for execution by at least one other  
2 device, the data source device comprising:

- 3 A. a frame acquisition module configured to obtain respective ones of the frames;
- 4 B. a frame execution time determination module configured to determine a time at which each  
5 respective frame is to be executed, and to associate the respective frame with a time stamp  
6 indicating its execution time;
- 7 C. a frame transmission module configured to transmit the series of frames to said at least one  
8 other device; and
- 9 D. a data source device migration control module configured to, in response to a predetermined  
10 event, provide migration information to another device, the migration information including  
11 a source for information respecting the frames to be distributed, timing information relative  
12 to the clock maintained by the data source device and identifications of the member devices  
13 of the synchrony group.

1 382. A method for operating a system to facilitate processing of data by device operating as a  
2 member of a synchrony group, synchronously with a clock maintained by a data source device that  
3 provides the data to the synchrony group, the method including the steps of

- 4     A.     enabling the data source device being to divide the data into a series of frames for  
5           distribution to the synchrony group, each frame being associated with a time stamp  
6           indicating a time, relative to a clock maintained by the data source device, at which the  
7           devices comprising the synchrony group are to process the frame;
- 8     B     enabling each member device in the synchrony group to:
- 9           (i)     periodically obtain from the data source device an indication of a current time value  
10           indicated by the data source device's clock;
- 11          (ii)    receive the series of frames from the data source device;
- 12          (iii)   determine, from the time stamp associated with each respective frame and a time  
13           differential value representing a difference between the current time value indicated  
14           by the data source device's clock, a current time value indicated by the member  
15           device's respective clock, a time, relative to the member device's respective clock, at  
16           which the member device is to process the frame; and
- 17          (iv)    process the respective frame at the determined time.

1     383. A method as defined in claim 382 in which at least one frame comprises audio data, each  
2     member device, while processing each frame, being enabled to generate a signal representing sound  
3     represented by the respective frame.

1     384. A method as defined in claim 382, the system comprising a plurality of member devices, the  
2     method including the steps of enabling the member devices to process each frame synchronously in  
3     relation to the clock maintained by the data source device so that they all produce sound represented  
4     by the respective frame synchronously.

1     385. A method as defined in claim 384 including the step of enabling the data source device to  
2     provide time stamps for at least two successive frames so that the member devices will play them  
3     with a selected time interval therebetween.

1     386. A method as defined in claim 385 in which the time interval is zero.

1 387. A method as defined in claim 382 in which one of the member devices operates as a master  
2 device for the synchrony group, any other member devices comprising respective slave devices, the  
3 method including the step of enabling the master device to perform at least one type of synchrony  
4 group management operation in connection with the member devices comprising the synchrony  
5 group.

1 388. A method as defined in claim 387, the method including the step of enabling the master device  
2 to perform at least one type of synchrony group management operation in response to control  
3 information provided thereto by a user interface module.

1 389. A method as defined in claim 388 further including the step of enabling the master device to  
2 provide status information relating to the status of the synchrony group to the user interface module.

1 390. A method as defined in claim 389 in which the status information includes identifications of  
2 the devices comprising the synchrony group.

1 391. A method as defined in claim 389 in which each frame is associated with a frame sequence,  
2 each frame sequence comprising at least one frame, the frame or frames comprising each frame  
3 sequence being associated with an audio track, each audio track being associated with an identifier,  
4 the status information including the identification of the audio track currently being played.

1 392. A method as defined in claim 388 the method comprising at least one additional device, in  
2 which, in one type of synchrony group management operation, the master device is configured to  
3 enable the at least one additional device to join the synchrony group as a slave device.

1 393. A method as defined in claim 392 in which the data source device is configured to distribute  
2 frames to the member devices using a selected multi-cast transmission methodology, the member  
3 devices being configured to buffer the frames until they are to be played, the method including the

4 step of, when the at least one additional device joins the synchrony group as a slave device, the  
5 enabling the data source device to transmit at least one previously distributed frame to the slave  
6 device using a selected unicast transmission methodology.

1 394. A method as defined in claim 387 in which, in at least one type of synchrony group  
2 management operation, the method includes the step of enabling the master device to enable the data  
3 source device to join the synchrony group as a slave device, the data source device continuing to  
4 operate as the data source device for the synchrony group.

1 395. A method as defined in claim 387 in which, in at least one type of synchrony group  
2 management operation, the method includes the step of enabling the master device to enable a slave  
3 device to disengage from the synchrony group, the disengaged slave device thereafter not being a  
4 member device in the synchrony group and not playing frames distributed by the data source device.

1 396. A method as defined in claim 387 in which, in at least one type of synchrony group  
2 management operation, the method includes the step of enabling the master device to control the  
3 series of frames to be distributed by the data source device.

1 397. A method as defined in claim 387 in which each frame is associated with a frame sequence,  
2 each frame sequence comprising at least one frame, the frame or frames comprising each frame  
3 sequence being associated with an audio track, the method including the step of enabling the master  
4 device being configured to control the frames to be distributed by the data source device on a track-  
5 by-track basis.

1 398. A method as defined in claim 387 in which, in at least one type of synchrony group  
2 management operation, the method includes the step of enabling the master device to control  
3 playback by the member devices of the frames associated with the respective audio tracks that have  
4 been distributed by the data source device in response to control information from the user interface  
5 module.

1 399. A method as defined in claim 387 in which, in response to control information from the user  
2 interface module to facilitate control of playback by the member devices, the method includes the  
3 step of enabling the master device to enable the data source device to distribute a playback control  
4 command to the member devices.

1 400. A method as defined in claim 399 in which a playback control command enables the member  
2 devices to terminate playback of a track that is currently being played back.

1 401. A method as defined in claim 399 in which the playback control command enables the member  
2 devices to terminate playback of a track with a frame subsequent to a frame currently being played.

1 402. A method as defined in claim 399 in which the playback control command enables the member  
2 devices to cancel playback of a track at least one of whose frames has been previously distributed,  
3 but for which playback has not begun.

1 403. A method as defined in claim 387 in which, in at least one type of synchrony group  
2 management operation, the method includes the step of enabling the member device operating as the  
3 master device to enable the master device to migrate from itself to another member device in the  
4 synchrony group.

1 404. A method as defined in claim 403 in which, in at least one type of synchrony group  
2 management operation, the method includes the step of enabling the master device to enable the data  
3 source device to migrate from one device to another device in the system.

1 405. A method as defined in claim 404 in which

2 A. the device operating as the data source device is enable to perform the step of, after being  
3 enabled to migrate the data source device to said other device, providing migration  
4 information to the other device, the migration information including a source for information



5           respecting the frames to be distributed, timing information relative to the clock maintained  
6           by the data source device and identifications of the member devices,

7       B.     the other device is enabled to, after receiving the migration information, perform the steps  
8           of

- 9           i.     distributing the series of frames to the synchrony group, each frame being associated  
10           with a time stamp indicating a time, relative to the timing information that it receives  
11           from the device operating as the data source device, at which the devices comprising  
12           the synchrony group are to execute the respective frame, and  
13           ii.    notifying the members of the synchrony group that it is to thereafter operate as the  
14           data source device.

1       406. A method as defined in claim 405 in which the information respecting the frames that are to  
2       be distributed is a source of streaming information, the other device being enabled to, after receiving  
3       the migration information, perform the steps of assembling the streaming information into frames  
4       and associating each frame with a said time stamp.

1       407. A method as defined in claim 405 in which the information respecting the frames that are to be  
2       distributed is in a file identified in the migration information, the other device being enabled to  
3       perform the steps of obtaining information from the identified file, assembling the information into  
4       frames and associating each frame with a said time stamp.

1       408. A method as defined in claim 407 in which the information respecting the frames that are to be  
2       distributed begins at an offset, identified in the migration information, into the identified file, the  
3       other device being enabled to perform the step of assembling the information from a position in the  
4       file associated with the identified offset.

1       409. A method as defined in claim 407 in which the information respecting the frames that are to be  
2       distributed is in a series of files identified in the migration information, the other device being

3 enabled to perform the step of obtaining information from successive files in the series assemble the  
4 information into frames and associate each frame with as said time stamp.

1 410. A method as defined in claim 382 including the step in which the data source is further  
2 configured to distribute the frames using a selected multi-cast message transmission methodology,  
3 the device being enabled to receive the frames using the selected multi-cast message transmission  
4 methodology.

1 411. A method as defined in claim 382 in which the data source device is enabled to perform the step  
2 of providing, provide, associated with at least one frame, a time stamp indicating a frame execution  
3 time later than the time currently indicated by the clock maintained by the data source device.

1 412. A method as defined in claim 411 in which the data source device is enabled to perform the step  
2 of selecting the delay interval between the time indicated by the time stamp and the current time so  
3 to be sufficient to provide that the at least one frame distributed by the data source device can be  
4 executed by the member devices at the time indicated by the time stamp.

1 413. A method as defined in claim 411 in which the data source device is enabled to perform the step  
2 of selecting the delay interval between the time indicated by the time stamp and the current time so  
3 to be sufficient to provide that the at least one frame distributed by the data source device can be  
4 distributed to the member devices for execution at the time indicated by the time stamp

1 414. A method as defined in claim 411 in which data source device is enabled to perform the steps  
2 of obtaining information associated with the frames from at least two types of information sources,  
3 and selecting, for each frame, the delay interval between the time indicated by the time stamp and  
4 the current time based on the information source type that is associated with the respective frame.

1 415. A method as defined in claim 382 in which at least one member device is further enabled to  
2 perform the step of adjusting its clock rate in relation to a clock rate value maintained by the data  
3 source device's clock.

1 416. A method as defined in claim 415 in which the at least one member device is enabled to  
2 perform the step of adjusting its clock rate in relation to time stamps associated with respective ones  
3 of the frames received from the data source device.

1 417. A method as defined in claim 382 in which at least one other device operates as a data source  
2 device configured to distribute frames to a second synchrony group, the method including the steps  
3 of enabling the device to operate both as the data source device for the first synchrony group and also  
4 operating as a member device of a second synchrony group.

1 418. A method as defined in claim 382 including, within a member device,

- 2 A. a frame receiving step of receiving the series of frames,
- 3 B. a current time retrieval step of obtaining, from the data source device, the current time value  
4 as indicated by the frame source's clock;
- 5 C. an execution time determination step of determining, from the time stamp associated with  
6 each respective frame and a time differential value representing a difference between the  
7 current time value obtained during the current time retrieval step and a current time value  
8 indicated by a clock maintained by the device, a time, relative to the member device's  
9 respective clock at which the frame is to be executed; and
- 10 D. a frame execution step of executing each respective frame at the time determined during the  
11 execution time determination step.

1 419. A method as defined in claim 418 further including a control step for controlling execution of  
2 commands received during the frame receiving step

1 420. A method as defined in claim 419 in which the at least one member device further comprises  
2 a buffer configured to buffer frames received from the data source device during the frame receiving  
3 step until they are to be executed, the frame execution step including the step of executing the  
4 buffered frames at the times determined during the execution time determination step.

1 420. A method as defined in claim 420 in which the series of frames includes a series of frame  
2 sequences with each frame sequence including a subset of the series of frames, the frame receiving  
3 step being further enabled to receive frame execution control commands for controlling frame  
4 execution, the control step including the step of, in response to receipt of at least one frame execution  
5 control command for controlling frame execution, controlling the frame execution step to terminate  
6 execution of a frame sequence currently being executed, and further to not execute subsequent  
7 frames in the frame sequence that have been buffered.

1 422. A method as defined in claim 421 in which the control step includes the step of enabling the  
2 frame execution step to resume execution of at least one frame associated with a subsequent frame  
3 sequence at a time determined during the execution time determination step.

1 423. A method as defined in claim 420 in which the series of frames includes a series of frame  
2 sequences with each frame sequence including a subset of the series of frames, the frame receiving  
3 step including the step of receiving frame execution control commands for controlling frame  
4 execution, the control step including the step of, in response to receipt of at least one frame execution  
5 control command to cancel execution of a frame sequence for which at least one frame has been  
6 buffered but for which execution has not begun, providing that frames from that frame sequence that  
7 have been buffered not be executed.

1 424. A method as defined in claim 423 in which the control step includes the step of enabling  
2 execution to resume of at least one frame associated with a frame sequence subsequent to the frame  
3 sequence for which at least one frame has been buffered but for which execution has not begun.

1 425. A method as defined in claim 418 in which the member device performs:

- 2 A. migration information receiving step of receiving migration information from the data source  
3 device, the migration information including a source for information respecting the frames  
4 to be distributed, timing information relative to the clock maintained by the data source  
5 device and identifications of the member devices of the synchrony group, and  
6 B. a migration control step of, after the migration information has been received.,  
7 i. distributing the series of frames to the synchrony group, each frame being associated  
8 with a time stamp indicating a time, relative to the timing information that it receives  
9 from the device operating as the data source device, at which the devices comprising  
10 the synchrony group are to execute the respective frame, and  
11 ii. notifying the members of the synchrony group that it is to thereafter operate as the  
12 data source device.

1 426. A method as defined in claim 425 in which the information respecting the frames that are to be  
2 distributed is a source of streaming information, the migration control step includes the steps of, after  
3 the migration information has been received, assembling the streaming information into frames and  
4 associating each frame with a said time stamp.

1 427. A method as defined in claim 425 in which the information respecting the frames that are to be  
2 distributed is in a file identified in the migration information, the migration control step including  
3 the steps of obtaining information from the identified file, assembling the information into frames  
4 and associating each frame with a said time stamp.

1 428. A method as defined in claim 427 in which the information respecting the frames that are to be  
2 distributed begins at an offset, identified in the migration information, into the identified file, the  
3 migration control step including the step of assembling the information from a position in the file  
4 associated with the identified offset.

1 429. A method as defined in claim 427 in which the information respecting the frames that are to be  
2 distributed is in a series of files identified in the migration information, the migration control step  
3 including the steps of obtaining information from successive files in the series assemble the  
4 information into frames and associating each frame with as said time stamp.

1 430. A method as defined in claim 418 in which the member device is further enabled to perform  
2 a clock rate adjustment step including the step of adjusting the member device's clock rate in relation  
3 to a clock rate value maintained by the data source device's clock.

1 431. A method as defined in claim 430 in which the clock rate adjustment step includes the step of  
2 determining adjust the clock rate in relation to time stamps associated with respective ones of the  
3 frames received from the data source device.

1 432. A method as defined in claim 382 of operating a device for distributing a series of frames for  
2 execution by at least one other device at respective execution times, the method comprising:

- 3 A. a frame acquisition step of obtaining respective ones of the frames;
- 4 B. a frame execution time determination step of determining a time at which each respective  
5 frame is to be executed, and to associate the respective frame with a time stamp indicating  
6 its execution time;
- 7 C. a frame transmission step of transmitting the series of frames to said at least one other  
8 device; and
- 9 D. an execution control command generation step of, in response to a predetermined event and  
10 during the frame transmission step, the insertion into the series of frames transmitted by the  
11 frame transmission module of a command to enable the at least one other device to modify  
12 the execution sequence of the frames transmitted thereto.

1 433. A method as defined in claim 432 in which the frame transmission step includes the step of  
2 utilizing a selected multi-cast transmission methodology.

1 434. A method as defined in claim 432 in which the predetermined event includes the step of  
2 receiving input indicia provided by an operator.

1 435. A method as defined in claim 434 in which the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the frame  
3 transmission step, the insertion into the series of frames of a command to enable the at least one  
4 other device to control execution of at least one frame in relation to the time the predetermined event  
5 occurs.

1 436. A method as defined in claim 435 in which, the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the frame  
3 transmission step, the insertion into the series of frames of a command to enable the at least one  
4 other device to terminate execution of a frame that it is currently executing and/or to not execute at  
5 least one frame that is to be executed subsequent to the predetermined event.

1 437. A method as defined in claim 434 in which the series of frames includes a series of frame  
2 sequences with each frame sequence including a sub-set of the series of frames, the execution control  
3 command generation step including the steps of, in response to said predetermined event,

4 (i) enabling during the frame transmission step the insertion, into the series of frames, of a  
5 command enabling the at least one other device to terminate execution of the currently  
6 executing frame and/or to not execute at least one subsequent frame, if any, in the frame  
7 sequence including the currently executing frame; and

8 (ii) enabling

9 (a) during the frame execution time determination step, that time stamps associated with  
10 frames of frame sequences subsequent to the frame sequence currently being  
11 executed will reflect the termination and/or non-execution of frames from the frame  
12 sequence of the frame that is currently being executed, and

13 (b) during the frame transmission step, the transmission of the frames of the subsequent  
14 frame sequences to the at least one other device.

1 438. A method as defined in claim 437 in which the frame transmission step includes the step of  
2 inserting a command into the frame sequence to enable the at least one other device to not execute  
3 all frames in the frame sequence subsequent to the terminated and/or non-executed frame.

1 439. A method as defined in claim 435 in which the execution control command generation step  
2 include the step of enabling, in response to said predetermined event and during the frame  
3 transmission step, the insertion into the series of frames of a command to enable the at least one  
4 other device to control execution of a frame in relation to the frame's position in the series of frames.

1 440. A method as defined in claim 439 in which the execution control command generation step  
2 includes the step of, in response to said predetermined event and during the frame transmission step,  
3 the insertion into the series of frames of a command to enable the at least one other device to cancel  
4 execution of a frame in relation to the frame's position in the series of frames.

1 441. A method as defined in claim 439 in which the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the frame  
3 transmission step, the inserting into the series of frames of a command to enable the at least one  
4 other device to cancel execution of a previously-transmitted frame in relation to the frame's position  
5 in the series of frames.

1 442. A method as defined in claim 441 in which, the execution control command generation step  
2 includes the step of, in response to said predetermined event and during the frame transmission step,  
3 the insertion into the series of frames of a command to enable the at least one other device to cancel  
4 execution of a previously-transmitted frame, in relation to the frame's position in the series of  
5 frames, for which execution has not begun.



1 443. A method as defined in claim 439 in which the series of frames includes a series of frame  
2 sequences with each frame sequence including a sub-set of the series of frames, the execution control  
3 command generation step including the steps of, in response to said predetermined event,

4 (i) enabling, during the frame transmission step, the insertion, into the series of frames, of a  
5 command enabling the at least one other device to cancel execution of a frame sequence for  
6 which execution has not begun; and

7 (ii) enabling

8 (a) during the frame execution time determination step, that time stamps associated with  
9 frames of frame sequences subsequent to the frame sequence whose execution was  
10 cancelled will reflect the cancellation, and

11 (b) during the frame transmission step, the transmission of the frames of the subsequent  
12 frame sequences to the at least one other device.

1 444. A method as defined in claim 382 in which the data source device is enabled to perform

2 A. a frame acquisition step of obtaining respective ones of the frames;

3 B. a frame execution time determination step of determining a time at which each respective  
4 frame is to be executed, and to associate the respective frame with a time stamp indicating  
5 its execution time;

6 C. a frame transmission step of transmitting the series of frames to said at least one other  
7 device; and

8 D. a data source device migration control step of, in response to a predetermined event,  
9 providing migration information to another device, the migration information including a  
10 source for information respecting the frames to be distributed, timing information relative  
11 to the clock maintained by the data source device and identifications of the member devices  
12 of the synchrony group.

1 445. A method as defined in claim 382 in which the data source device is enabled to perform the step  
2 of providing, associated with at least one frame, a time stamp indicating a frame execution time later  
3 than the time currently indicated by the clock maintained by the data source device.

1 446. A method as defined in claim 445 in which the data source device is enabled to perform the step  
2 of selecting the delay interval between the time indicated by the time stamp and the current time so  
3 to be sufficient to provide that the at least one frame distributed by the data source device can be  
4 executed by the member devices at the time indicated by the time stamp.

1 447. A method as defined in claim 446 in which the data source device is enabled to perform the step  
2 of selecting the delay interval between the time indicated by the time stamp and the current time so  
3 to be sufficient to provide that the at least one frame distributed by the data source device can be  
4 distributed to the member devices for execution at the time indicated by the time stamp.

1 448. A method as defined in claim 445 in which data source device is enabled to perform the step  
2 of obtaining information associated with the frames from at least two types of information sources,  
3 and selecting for each frame the delay interval between the time indicated by the time stamp and the  
4 current time based on the information source type that is associated with the respective frame.

1 449. A method of enabling a device to process a series of frames of data provided by a data source  
2 at times specified by the data source in relation to a clock maintained by the data source, the device  
3 comprising

- 4 A. an interface step of receiving the series of frames, each frame being associated with a time  
5 stamp, each time stamp indicating a time value relative to a time indicated a clock  
6 maintained by the data source, at which the device is to process the respective frame;
- 7 B. a current time retrieval step of obtaining, from the data source, a current time value as  
8 indicated by the data source's clock;
- 9 C. an processing time determination step of determining, from the time stamp associated with  
10 each respective frame and a time differential value representing a difference between the  
11 current time value obtained during the current time retrieval step and a current time value  
12 indicated by a clock maintained by the device, a time, relative to the device's respective  
13 clock, at which the frame is to be processed; and

14 D. a frame processing step of processing each respective frame at the time determined during  
15 the processing time determination step.

1 450. A method as defined in claim 449 in which at least one frame comprises audio data, each  
2 member device, while processing said at least one frame, generating a signal representing sound  
3 represented by the respective frame.

1 451. A method as defined in claim 449 further including a control step for controlling execution of  
2 commands received by said device.

1 452. A method as defined in claim 451 further comprising a buffer configured to buffer frames that  
2 the interface module has received until they are to be processed, the frame processing step including  
3 the step of processing the buffered frames at the times determined during the processing time  
4 determination step.

1 453 . A method as defined in claim 451 in which the each frame is associated with a track, each track  
2 including at least one frame, the interface module being further configured to receive playback  
3 control commands for controlling processing of tracks, the method including the step of enabling  
4 the control module to execute at least one playback control command controlling track processing.

1 454. A method as defined in claim 453 including the step of, in response to at least one type of  
2 playback control command, enabling the control module to, in turn, enable the frame processing  
3 module to terminate playback of a track that is currently being played back.

1 455. A method as defined in claim 454 including the step of, in response to the playback control  
2 command, enabling the control module to terminate playback of a track with a frame subsequent to  
3 a frame currently being played.

1 456. A method as defined in claim 452 including the step of, in response to the playback control  
2 command, enabling the control module to cancel playback of a track at least one of whose frames  
3 has been previously distributed, but for which playback has not begun.

1 457. A method as defined in claim 453 including the step of enabling the control module to enable  
2 the frame processing module to resume processing of at least one frame associated with a subsequent  
3 track at a time determined by the processing time determination module.

1 458. A method as defined in claim 449 including the step of enabling the control module to, in  
2 response to receipt of a command to become a member of a synchrony group, enable the interface  
3 module to receive frames for processing by the frame processing module.

1 459. A method as defined in claim 458 including the step of enabling the control module to, in  
2 response to receipt of a command to become a member of a synchrony group, enable the interface  
3 module to receive frames currently being transmitted using a selected multi-cast transmission  
4 methodology, and further to retrieve at least one previously distributed frame using a selected unicast  
5 transmission methodology.

1 460. A method as defined in claim 449 including the step of enabling the control module to, in  
2 receipt of a command to disengage from a synchrony group, disable the interface module from  
3 receiving frames and the frame processing module from processing previously received frames that  
4 have not yet been processed.

1 461. A method as defined in claim 449, further including the steps of receiving control information  
2 from a user interface module, and enabling the control module to enable selected operations to be  
3 performed in response to the control information.

1 462. A method as defined in claim 461 including the step of, in response to control information to  
2 enable another device to become a member of the device's synchrony group, enabling the control

3 module to enable the interface module to transmit a command to the other device to enable the other  
4 device to become a member of the synchrony group.

1 463. A method as defined in claim 461 including the step of, in response to control information to  
2 enable another device that is a member of the device's synchrony group to disengage from the  
3 synchrony group, enabling the control module to enable transmission of a command to the other  
4 device to enable the other device to disengage from the synchrony group.

1 464. A method as defined in claim 461 including the step of, in response to control information to  
2 enable the data source to begin operating, enabling the control module to perform selected operations  
3 to enable the data source to begin operating.

1 465. A method as defined in claim 464, the device also operating as the data source, the method  
2 including a frame generator step of, under control of the control module, obtaining information from  
3 which the frames are to be generated and generating the frames.

1 466. A method as defined in claim 465 further comprising the step of transmitting the frames to at  
2 least one other device.

1 467. A method as defined in claim 465 in which the device is not the data source, the method  
2 including the step of enabling the control module to enable transmission of a command to enable the  
3 data source to operate.

1 468. A method as defined in claim 467 in which each frame is associated with a track, each track  
2 including at least one frame, and, in response to receipt of control information enabling processing  
3 of a track currently being processed to be terminated, the method including the step of enabling the  
4 control module to enable transmission of a command to enable the data source to insert a  
5 resynchronize command in the series of frames associated with the track to enable termination of  
6 processing of the track.

1 469. A method as defined in claim 467 in which each frame is associated with a track, each track  
2 including at least one frame, and, in response to receipt of control information enabling processing  
3 of a track at least a portion of which has been received, but for which processing has not begun, the  
4 method including the step of enabling the control module to enable transmission of a command to  
5 enable the data source to insert a resynchronize command in the series of commands to disable  
6 processing of the track.

1 470. A method as defined in claim 451 further including the step of enabling the control module to  
2 enable the user interface module interface module to transmit status information to the user interface  
3 module.

1 471. A method as defined in claim 470 in which the status information includes the processing status  
2 of at least one frame.

1 472. A method as defined in claim 469 in which the member device performs:

- 2 A. migration information receiving step of receiving migration information from the data source  
3 device, the migration information including a source for information respecting the frames  
4 to be distributed, timing information relative to the clock maintained by the data source  
5 device and identifications of the member devices of the synchrony group, and  
6 B. a migration control step of, after the migration information has been received.,  
7 i. distributing the series of frames to the synchrony group, each frame being associated  
8 with a time stamp indicating a time, relative to the timing information that it receives  
9 from the device operating as the data source device, at which the devices comprising  
10 the synchrony group are to execute the respective frame, and  
11 ii. notifying the members of the synchrony group that it is to thereafter operate as the  
12 data source device.

1 473. A method as defined in claim 472 in which the information respecting the frames that are to be  
2 distributed is a source of streaming information, the migration control step includes the steps of, after  
3 the migration information has been received, assembling the streaming information into frames and  
4 associating each frame with a said time stamp.

1 474. A method as defined in claim 472 in which the information respecting the frames that are to be  
2 distributed is in a file identified in the migration information, the migration control step including  
3 the steps of obtaining information from the identified file, assembling the information into frames  
4 and associating each frame with a said time stamp.

1 475. A method as defined in claim 474 in which the information respecting the frames that are to be  
2 distributed begins at an offset, identified in the migration information, into the identified file, the  
3 migration control step including the step of assembling the information from a position in the file  
4 associated with the identified offset.

1 476. A method as defined in claim 474 in which the information respecting the frames that are to  
2 be distributed is in a series of files identified in the migration information, the migration control step  
3 including the steps of obtaining information from successive files in the series assemble the  
4 information into frames and associating each frame with as said time stamp.

1 477. A method as defined in claim 449 in which the member device is further enabled to perform  
2 a clock rate adjustment step including the step of adjusting the member device's clock rate in relation  
3 to a clock rate value maintained by the data source device's clock.

1 478. A method as defined in claim 477 in which the clock rate adjustment step includes the step of  
2 determining adjust the clock rate in relation to time stamps associated with respective ones of the  
3 frames received from the data source device.

1 479. A method of operating a device for distributing a series of frames for execution by at least one  
2 other device at respective execution times, the method comprising:

- 3 A. a frame acquisition step of obtaining respective ones of the frames;  
4 B. a frame execution time determination step of determining a time at which each respective  
5 frame is to be executed, and to associate the respective frame with a time stamp indicating  
6 its execution time;  
7 C. a frame transmission step of transmitting the series of frames to said at least one other  
8 device; and  
9 D. an execution control command generation step of, in response to a predetermined event and  
10 during the frame transmission step, the insertion into the series of frames transmitted by the  
11 frame transmission module of a command to enable the at least one other device to modify  
12 the execution sequence of the frames transmitted thereto.

1 480. A method as defined in claim 479 in which at least one frame comprises audio data.

1 481. A method as defined in claim 479 in which the frame transmission step includes the step of  
2 utilizing a selected multi-cast transmission methodology.

1 482. A method as defined in claim 479 in which the predetermined event includes the step of  
2 receiving input indicia provided by an operator.

1 483. A method as defined in claim 482 in which the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the frame  
3 transmission step, the insertion into the series of frames of a command to enable the at least one  
4 other device to control execution of at least one frame in relation to the time the predetermined event  
5 occurs.

1 484. A method as defined in claim 483 in which, the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the frame



3 transmission step, the insertion into the series of frames of a command to enable the at least one  
4 other device to terminate execution of a frame that it is currently executing and/or to not execute at  
5 least one frame that is to be executed subsequent to the predetermined event.

1 485. A method as defined in claim 482 in which the series of frames includes a series of frame  
2 sequences with each frame sequence including a sub-set of the series of frames, the execution control  
3 command generation step including the steps of, in response to said predetermined event,

4 (i) enabling during the frame transmission step the insertion, into the series of frames, of a  
5 command enabling the at least one other device to terminate execution of the currently  
6 executing frame and/or to not execute at least one subsequent frame, if any, in the frame  
7 sequence including the currently executing frame; and

8 (ii) enabling

9 (a) during the frame execution time determination step, that time stamps associated with  
10 frames of frame sequences subsequent to the frame sequence currently being  
11 executed will reflect the termination and/or non-execution of frames from the frame  
12 sequence of the frame that is currently being executed, and

13 (b) during the frame transmission step, the transmission of the frames of the subsequent  
14 frame sequences to the at least one other device.

1 486. A method as defined in claim 485 in which the frame transmission step includes the step of  
2 inserting a command into the frame sequence to enable the at least one other device to not execute  
3 all frames in the frame sequence subsequent to the terminated and/or non-executed frame.

1 487. A method as defined in claim 479 in which the execution control command generation step  
2 include the step of enabling, in response to said predetermined event and during the frame  
3 transmission step, the insertion into the series of frames of a command to enable the at least one  
4 other device to control execution of a frame in relation to the frame's position in the series of frames.

1 488. A method as defined in claim 487 in which the execution control command generation step  
2 includes the step of, in response to said predetermined event and during the frame transmission step,  
3 the insertion into the series of frames of a command to enable the at least one other device to cancel  
4 execution of a frame in relation to the frame's position in the series of frames.

1 489. A method as defined in claim 487 in which the execution control command generation step  
2 includes the step of enabling, in response to said predetermined event and during the frame  
3 transmission step, the inserting into the series of frames of a command to enable the at least one  
4 other device to cancel execution of a previously-transmitted frame in relation to the frame's position  
5 in the series of frames.

1 490. A method as defined in claim 489 in which, the execution control command generation step  
2 includes the step of, in response to said predetermined event and during the frame transmission step,  
3 the insertion into the series of frames of a command to enable the at least one other device to cancel  
4 execution of a previously-transmitted frame, in relation to the frame's position in the series of  
5 frames, for which execution has not begun.

1 491. A method as defined in claim 488 in which the series of frames includes a series of frame  
2 sequences with each frame sequence including a sub-set of the series of frames, the execution control  
3 command generation step including the steps of, in response to said predetermined event,

4 (i) enabling, during the frame transmission step, the insertion, into the series of frames, of a  
5 command enabling the at least one other device to cancel execution of a frame sequence for  
6 which execution has not begun; and

7 (ii) enabling

8 (a) during the frame execution time determination step, that time stamps associated with  
9 frames of frame sequences subsequent to the frame sequence whose execution was  
10 cancelled will reflect the cancellation, and

11 (b) during the frame transmission step, the transmission of the frames of the subsequent  
12 frame sequences to the at least one other device.

1 492. A method of operating a device for distributing a series of frames for execution by at least one  
2 other device at respective execution times, the method comprising:

3 A. a frame acquisition step of obtaining respective ones of the frames;

4 B. a frame execution time determination step of determining a time at which each respective  
5 frame is to be executed, and to associating the respective frame with a time stamp indicating  
6 its execution time, the frame execution time determination step including the step of  
7 providing, associated with at least one frame, a time stamp indicating a frame execution time  
8 later than the time currently indicated by a clock maintained by the data source device; and

9 C. a frame transmission step of transmitting the series of frames to said at least one other  
10 device.

1 493. A method as defined in claim 492 in which at least one frame comprises audio data.

1 494. A method as defined in claim 492 in which the frame execution time determination step  
2 includes the step of selecting the delay interval between the time indicated by the time stamp and  
3 the current time so to be sufficient to provide that the at least one frame distributed by the device can  
4 be executed by at least one other device at the time indicated by the time stamp.

1 495. A method as defined in claim 494 in which the frame execution time determination step  
2 includes the step of selecting the delay interval between the time indicated by the time stamp and  
3 the current time so to be sufficient to provide that the at least one frame distributed by the device can  
4 be distributed to other devices over a network for execution by the other devices at the time indicated  
5 by the time stamp.

1 496. A method as defined in claim 492 in which frame acquisition step includes the step of obtaining  
2 information associated with the frames from at least two types of information sources, the frame  
3 execution time determination step including the step of selecting, for each frame the delay interval

between the time indicated by the time stamp and the current time based on the information source type that is associated with the respective frame.

497. A method of operating a device for distributing a series of frames for execution by at least one other device, the method comprising:

- A. a frame acquisition module configured to obtain respective ones of the frames;
- B. a frame execution time determination module configured to determine a time at which each respective frame is to be executed, and to associate the respective frame with a time stamp indicating its execution time;
- C. a frame transmission module configured to transmit the series of frames to said at least one other device; and
- D. a data source device migration control module configured to, in response to a predetermined event, provide migration information to another device, the migration information including a source for information respecting the frames to be distributed, timing information relative to the clock maintained by the data source device and identifications of the member devices of the synchrony group.

498. A method as defined in claim 497 in which at least one frame comprises audio data.

499. A computer program product for use in connection with a computer to provide a device for processing a series of frames of data provided by a data source at times specified by the data source in relation to a clock maintained by the data source, the computer program product comprising a computer-readable medium having encoded thereon

- A. an interface module configured to enable the computer to receive the series of frames, each frame being associated with a time stamp, each time stamp indicating a time value relative to a time indicated a clock maintained by the data source, at which the device is to process the respective frame;
- B. a current time retrieval module configured to enable the computer to obtain, from the data source, a current time value as indicated by the data source's clock;

- 11 C. an processing time determination module configured to enable the computer to determine,  
12 from the time stamp associated with each respective frame and a time differential value  
13 representing a difference between the current time value obtained by the current time  
14 retrieval module and a current time value indicated by a clock maintained by the device, a  
15 time, relative to the device's respective clock, at which the frame is to be processed; and  
16 D. a frame processing module configured to enable the computer to process each respective  
17 frame at the time determined by the processing time determination module.

1 500. A computer program product as defined in claim 499 in which at least one frame comprises  
2 audio data, the computer, while processing said frame, generating a signal representing sound  
3 represented by the respective frame.

1 501. A computer program product as defined in claim 499 further including a control module a  
2 control module for enabling said computer to control execution of commands received by the  
3 interface module.

1 502. A computer program product as defined in claim 501 further comprising a buffer configured  
2 to enable the computer to buffer frames that the interface module has received until they are to be  
3 processed, the frame processing module being configured to enable the computer to process the  
4 buffered frames at the times determined by the processing time determination module.

1 503. A computer program product as defined in claim 502 in which the each frame is associated with  
2 a track, each track including at least one frame, the interface module being further configured to  
3 enable the computer to receive playback control commands for controlling processing of tracks, the  
4 control module being configured to enable the computer to execute at least one playback control  
5 command controlling track processing.

1 504. A computer program product as defined in claim 503 in which at least one type of playback  
2 control command enables the control module to, in turn, enable the frame processing module to  
3 terminate playback of a track that is currently being played back.

1 505. A computer program product as defined in claim 504 in which the playback control command  
2 enables the control module to terminate playback of a track with a frame subsequent to a frame  
3 currently being played.

1 506. A computer program product as defined in claim 503 in which the playback control command  
2 enables the control module to cancel playback of a track at least one of whose frames has been  
3 previously distributed, but for which playback has not begun.

1 507. A computer program product as defined in claim 503 in which the control module is configured  
2 to enable the computer to enable the frame processing module to resume processing of at least one  
3 frame associated with a subsequent track at a time determined by the processing time determination  
4 module.

1 508. A computer program product as defined in claim 501, the control module being configured to  
2 enable the computer to, in response to receipt of a command to become a member of a synchrony  
3 group, enable the interface module to receive frames for processing by the frame processing module.

1 509. A computer program product as defined in claim 508 in which the control module is configured  
2 to enable the computer to, in response to receipt of a command to become a member of a synchrony  
3 group, enable the interface module to receive frames currently being transmitted using a selected  
4 multi-cast transmission methodology, and further to retrieve at least one previously distributed frame  
5 using a selected unicast transmission methodology.

1 510. A computer program product as defined in claim 501 in which the control module is configured  
2 to enable the computer to, in receipt of a command to disengage from a synchrony group, disable

3 the interface module from receiving frames and the frame processing module from processing  
4 previously received frames that have not yet been processed.

1 511. A computer program product as defined in claim 501 further comprising a user interface  
2 module interface module configured to receive control information from a user interface module,  
3 the control module being configured to enable the computer to enable selected operations to be  
4 performed in response to the control information.

1 512. A computer program product as defined in claim 511 in which, in response to control  
2 information to enable another device to become a member of the device's synchrony group, the  
3 control module enables the interface module to transmit a command to the other device to enable the  
4 other device to become a member of the synchrony group.

1 513. A computer program product as defined in claim 511 in which, in response to control  
2 information to enable another device that is a member of the device's synchrony group to disengage  
3 from the synchrony group, the control module enables the interface module to transmit a command  
4 to the other device to enable the other device to disengage from the synchrony group.

1 514. A computer program product as defined in claim 511 in which, in response to control  
2 information to enable the data source to begin operating, the control module performs selected  
3 operations to enable the data source to begin operating.

1 515. A computer program product as defined in claim 514, the device also operating as the data  
2 source, the device including a frame generator module configured to enable the computer to, under  
3 control of the control module, obtain information from which the frames are to be generated and  
4 generate the frames.

1 516. A computer program product as defined in claim 515 in which the interface module is further  
2 configured to enable the computer to transmit the frames to at least one other device.

1 517. A computer program product as defined in claim 515 in which the device is not the data source,  
2 the control module being configured to enable the computer to enable the interface module to  
3 transmit a command to enable the data source to operate.

1 518. A computer program product as defined in claim 517 in which each frame is associated with  
2 a track, each track including at least one frame, and, in response to receipt of control information  
3 enabling processing of a track currently being processed to be terminated , the control module is  
4 configured to enable the computer to enable the interface module to transmit a command to enable  
5 the data source to insert a resynchronize command in the series of frames associated with the track  
6 to enable termination of processing of the track.

1 519. A computer program product as defined in claim 517 in which each frame is associated with  
2 a track, each track including at least one frame, and, in response to receipt of control information  
3 enabling processing of a track at least a portion of which has been received, but for which processing  
4 has not begun, the control module is configured to enable the computer to enable the interface  
5 module to transmit a command to enable the data source to insert a resynchronize command in the  
6 series of commands to disable processing of the track.

1 520. A computer program product as defined in claim 517 in which the control module is configured  
2 to enable the computer to enable the user interface module interface module to transmit status  
3 information to the user interface module.

1 521. A computer program product as defined in claim 520 in which the status information includes  
2 the processing status of at least one frame.

1 522. A computer program product as defined in claim 499 further including:

2 A. a migration information receiving module configured to enable the computer to receive  
3 migration information from the data source device, the migration information including a



4 source for information respecting the frames to be distributed, timing information relative  
5 to the clock maintained by the data source device and identifications of the member devices  
6 of the synchrony group, and

7 B. a migration control module configured to enable the computer to, after the migration  
8 information has been received.,

9 i. distribute the series of frames to the synchrony group, each frame being associated  
10 with a time stamp indicating a time, relative to the timing information that it receives  
11 from the device operating as the data source device, at which the devices comprising  
12 the synchrony group are to execute the respective frame, and

13 ii. notify the members of the synchrony group that it is to thereafter operate as the data  
14 source device.

1 523. A computer program product as defined in claim 522 in which the information respecting the  
2 frames that are to be distributed is a source of streaming information, the migration control module  
3 being configured to enable the computer to, after the migration information has been received,  
4 assemble the streaming information into frames and associate each frame with a said time stamp.

1 524. A computer program product as defined in claim 522 in which the information respecting the  
2 frames that are to be distributed is in a file identified in the migration information, the migration  
3 control module being configured to enable the computer to obtain information from the identified  
4 file, assemble the information into frames and associate each frame with a said time stamp.

1 525. A computer program product as defined in claim 524 in which the information respecting the  
2 frames that are to be distributed begins at an offset, identified in the migration information, into the  
3 identified file, the migration control module being configured to enable the computer to assemble  
4 the information from a position in the file associated with the identified offset.

1 526. A computer program product as defined in claim 524 in which the information respecting the  
2 frames that are to be distributed is in a series of files identified in the migration information, the

3 migration control module being configured to enable the computer to obtain information from  
4 successive files in the series assemble the information into frames and associate each frame with as  
5 said time stamp.

1 527. A computer program product as defined in claim 499 further including a clock rate adjustment  
2 module configured to enable the computer to adjust the member device's clock rate in relation to a  
3 clock rate value maintained by the data source device's clock.

1 528. A computer program product as defined in claim 527 in which the clock rate adjustment module  
2 is configured to enable the computer to adjust the clock rate in relation to time stamps associated  
3 with respective ones of the frames received from the data source device.

1 529. A computer program product for use in connection with a computer to provide a data source  
2 device for distributing a series of frames for execution by at least one other device at respective  
3 execution times, the computer program product comprising a computer readable medium having  
4 encoded thereon:

- 5 A. a frame acquisition module configured to enable the computer to obtain respective ones of  
6 the frames;
- 7 B. a frame execution time determination module configured to enable the computer to  
8 determine a time at which each respective frame is to be executed, and to associate the  
9 respective frame with a time stamp indicating its execution time;
- 10 C. a frame transmission module configured to enable the computer to transmit the series of  
11 frames to said at least one other device; and
- 12 D. an execution control command generation module configured to enable the computer to , in  
13 response to a predetermined event, enable the frame transmission module to insert into the  
14 series of frames transmitted by the frame transmission module a command to enable the at  
15 least one other device to modify the execution sequence of the frames transmitted thereto.

1 530. A computer program product as defined in claim 529 in which at least one frame comprises  
2 audio data.

1 531. A computer program product as defined in claim 529 in which the frame transmission module  
2 is configured to enable the computer to utilize a selected multi-cast transmission methodology.

1 532. A computer program product as defined in claim 529 in which the predetermined event  
2 comprises input indicia provided by an operator.

1 533. A computer program product as defined in claim 529 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the frame transmission module to insert into the series of frames transmitted by  
4 the frame transmission module a command to enable the at least one other device to control  
5 execution of at least one frame in relation to the time the predetermined event occurs.

1 534. A computer program product as defined in claim 533 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the frame transmission module to insert into the series of frames transmitted by  
4 the frame transmission module a command to enable the at least one other device to terminate  
5 execution of a frame that it is currently executing and/or to not execute at least one frame that is to  
6 be executed subsequent to the predetermined event.

1 535. A computer program product as defined in claim 533 in which the series of frames includes a  
2 series of frame sequences with each frame sequence including a sub-set of the series of frames, the  
3 execution control command generation module being configured to enable the computer to , in  
4 response to said predetermined event,

5 (i) enable the frame transmission module to insert into the series of frames transmitted by the  
6 frame transmission module, a command enabling the at least one other device to terminate

7 execution of the currently executing frame and/or to not execute at least one subsequent  
8 frame, if any, in the frame sequence including the currently executing frame; and

9 (ii) enable

10 (a) the frame execution time determination module to provide that time stamps  
11 associated with frames of frame sequences subsequent to the frame sequence  
12 currently being executed will reflect the termination and/or non-execution of frames  
13 from the frame sequence of the frame that is currently being executed, and

14 (b) the frame transmission module to transmit the frames of the subsequent frame  
15 sequences to the at least one other device.

1 536. A computer program product as defined in claim 535 in which the frame transmission module  
2 is configured to enable the computer to insert a command to enable the at least one other device to  
3 not execute all frames in the frame sequence subsequent to the terminated and/or non-executed  
4 frame.

1 537. A computer program product as defined in claim 529 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the frame transmission module to insert into the series of frames transmitted by  
4 the frame transmission module a command to enable the at least one other device to control  
5 execution of a frame in relation to the frame's position in the series of frames.

1 538. A computer program product as defined in claim 537 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the frame transmission module to insert into the series of frames transmitted by  
4 the frame transmission module a command to enable the at least one other device to cancel execution  
5 of a frame in relation to the frame's position in the series of frames.

1 539. A computer program product as defined in claim 537 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the

3 computer to enable the frame transmission module to insert into the series of frames transmitted by  
4 the frame transmission module a command to enable the at least one other device to cancel execution  
5 of a previously-transmitted frame in relation to the frame's position in the series of frames.

1 540. A computer program product as defined in claim 539 in which, in response to said  
2 predetermined event, the execution control command generation module is configured to enable the  
3 computer to enable the frame transmission module to insert into the series of frames transmitted by  
4 the frame transmission module a command to enable the at least one other device to cancel execution  
5 of a previously-transmitted frame, in relation to the frame's position in the series of frames, for which  
6 execution has not begun.

1 541. A computer program product as defined in claim 537 in which the series of frames includes a  
2 series of frame sequences with each frame sequence including a sub-set of the series of frames, the  
3 execution control command generation module being configured to enable the computer to , in  
4 response to said predetermined event,

- 5 (i) enable the frame transmission module to insert into the series of frames transmitted by the  
6 frame transmission module, a command enabling the at least one other device to cancel  
7 execution of a frame sequence for which execution has not begun; and
- 8 (ii) enable
  - 9 (a) the frame execution time determination module to provide that time stamps  
10 associated with frames of frame sequences subsequent to the frame sequence whose  
11 execution was cancelled will reflect the cancellation, and
  - 12 (b) the frame transmission module to transmit the frames of the subsequent frame  
13 sequences to the at least one other device.

1 542. A computer program product for use in connection with a computer to provide a data source  
2 device for distributing a series of frames for execution by at least one other device at respective  
3 execution times, the computer program product comprising a computer readable medium having  
4 encoded thereon:

- 5 A. a frame acquisition module configured to enable the computer to obtain respective ones of  
6 the frames;
- 7 B. a frame execution time determination module configured to enable the computer to  
8 determine a time at which each respective frame is to be executed, and to associate the  
9 respective frame with a time stamp indicating its execution time, the frame execution time  
10 determination module being configured to enable the computer to provide, associated with  
11 at least one frame, a time stamp indicating a frame execution time later than the time  
12 currently indicated by a clock maintained by the data source device; and
- 13 C. a frame transmission module configured to enable the computer to transmit the series of  
14 frames to said at least one other device.

1 543. A computer program product as defined in claim 542 in which the data is audio data.

1 544. A computer program product as defined in claim 542 in which the frame execution time  
2 determination module is configured to enable the computer to select the delay interval between the  
3 time indicated by the time stamp and the current time so to be sufficient to provide that the at least  
4 one frame distributed by the data source device can be executed by the member devices at the time  
5 indicated by the time stamp.

1 545. A computer program product as defined in claim 544 in which the frame execution time  
2 determination module is configured to enable the computer to select the delay interval between the  
3 time indicated by the time stamp and the current time so to be sufficient to provide that the at least  
4 one frame distributed by the data source device can be distributed to the member devices for  
5 execution at the time indicated by the time stamp.

1 546. A computer program product as defined in claim 542 in which frame acquisition module is  
2 configured to enable the computer to obtain information associated with the frames from at least two  
3 types of information sources, the frame execution time determination module being configured to  
4 enable the computer to select, for each frame the delay interval between the time indicated by the

5 time stamp and the current time based on the information source type that is associated with the  
6 respective frame.

1 547. A computer program product for use in connection with a computer to provide a data source  
2 device for distributing a series of frames for execution by at least one other device, the computer  
3 program product comprising a computer readable medium having encoded thereon:

- 4 A. a frame acquisition module configured to enable the computer to obtain respective ones of  
5 the frames;
- 6 B. a frame execution time determination module configured to enable the computer to  
7 determine a time at which each respective frame is to be executed, and to associate the  
8 respective frame with a time stamp indicating its execution time;
- 9 C. a frame transmission module configured to enable the computer to transmit the series of  
10 frames to said at least one other device; and
- 11 D. a data source device migration control module configured to enable the computer to, in  
12 response to a predetermined event, provide migration information to another device, the  
13 migration information including a source for information respecting the frames to be  
14 distributed, timing information relative to the clock maintained by the data source device  
15 and identifications of the member devices of the synchrony group.

1 548. A computer program product as defined in claim 547 in which the data is audio data.